**CONTRACT NAS5-32605**
**EOSDIS IV&V**

# EOS GROUND SYSTEM (EGS) TEST VERSION INTEGRATION AND TEST PLAN

## Baseline

(Deliverable 1103)

## November 14, 1995

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# EOS GROUND SYSTEM (EGS) TEST VERSION INTEGRATION AND TEST PLAN

## Baseline

(Deliverable 1103)

## November 14, 1995

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# EXECUTIVE SUMMARY

This document contains the detailed integration and test plans for the Earth Observing System (EOS) Ground System (EGS) Test Version. The EGS Test Version is an early EGS delivery supported by the EOS Data Information System (EOSDIS) Core Systems (ECS) Interim Release one (IR-1) and EOSDIS Version 0 (V0). The EGS Test Version provides the capabilities to support testing of the Tropical Rainfall Measuring Mission (TRMM) interfaces and the basic ECS data ingest function.

This testing will be conducted by the EOSDIS Integration and Test (I&T) Contractor under the direction of the ESDIS I&T Manager.

National Aeronautics and Space Administration (NASA) Institutional elements required to support this testing are the Sensor Data Processing Facility (SDPF) and the NASA Science Internet (NSI).

The EGS Test Version I&T program is organized into eight external interface tests and two functional thread tests. A schedule and execution order dependencies are provided. For each test in the series, the following information is included:

- Test objectives
- Trace to the Level 3 requirements with method of verification
- The required systems configuration for testing
- Support requirements, including requirements for external support, a test data description, and
- A narrative description for each test case supporting the test.

The current version of this document (14 Nov 95) assumes that there will not be an ECS Distributed Active Archive Centers (DAAC) at MSFC and that the support for the Lightning Imaging Sensor (LIS) instrument will become the responsibility of the Goddard Space Flight Center (GSFC) DAAC. It is assumed that the LIS Science Computing Facility (SCF) will remain at the Marshall Space Flight Center (MSFC). These decisions were not fully finalized before document delivery.

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# TABLE OF EXHIBITS

# 1. INTRODUCTION

## *1.1 Purpose and Scope*

The purpose of this document is to provide detailed planning for the I&T of the EGS Test Version. It is intended to provide a detailed description of the Test Version I&T effort for internal and external review, and to provide the information necessary to allow the generation of detailed test procedures. The scope is limited to Test Version I&T.

## *1.2 Content*

The document is organized into four sections and two appendices:

- Section 1 provides introductory material
- Section 2 provides an overview of the EGS Test Version systems
- Section 3 provides an overview of the Test Version I&T program
- Section 4 provides detailed test planning information for each test in the series
- Appendix A provides a requirement traceability and verification matrix, and
- Appendix B provides a list of acronyms.

## *1.3 Applicable Documents*

The following documents are the parents from which this document derives its scope and content:

| | |
|---|---|
| EOSVV-0301 | Independent Verification and Validation (IV&V) Management Plan, 8/15/94 |
| EOSVV-0302 | Independent System Verification and Validation Plan (ISVVP), 12/15/94 |
| EOSVV-1005 | EGS Integration, Test and Validation Plan (EITVP) baseline, June 30, 1995 |
| EOSVV-1102 | EGS Integration and Test (I&T) Plan, August 10, 1995 |

The following Interface Control Documents (ICDs) describe the interfaces under test:

| | |
|---|---|
| 209-CD-007-002 | Interface Control Document Between EOSDIS Core System (ECS) and TRMM Science Data and Information System (TSDIS), July 1995 |
| 560-203.103 | SDPF - TRMM Consumer ICD, Feb. 1995 |
| 209-CD-001-001 | Interface Control Document Between EOSDIS Core System (ECS) and NASA Science Internet (NSI), Nov. 1994 |
| 209-CD-005-002 | Interface Control Document Between EOSDIS Core System (ECS) and Science Computing Facilities (SCF), July 1995 |
| 209-CD-002-002 | Interface Control Document Between EOSDIS Core Systems and ASTER Ground Data System, October 1995 |

| | |
|---|---|
| 209-CD-008-002 | Interface Control Document Between EOSDIS Core System (ECS) and the GSFC DAAC |
| 209-CD-010-001 | Interface Control Document Between EOSDIS Core System (ECS) and the LaRC DAAC |
| 209-CD-013-001 | Interface Control Document Between EOSDIS Core System (ECS) and the Landsat 7 System |
| **TBD** | ECS - EBnet ICD |

The following TRMM test documents were referenced:

| | |
|---|---|
| CSC/CTA | Tropical Rainfall Measuring Mission Science and Data Information System Integration and Test Plan Vols. 1 - 3, 4 Oct 95. |
| GSFC 490 | TRMM Ground Segment Integration and Certification Management Plan, July 1995 |
| 510-2ITP/0295 | Tropical Rainfall Measuring Mission Observatory to Mission Operations Center Interface Test Plan, July 1995 |
| GSFC 513.2 | Tropical Rainfall Measuring Mission Ground Data System Integration and Test Plan, October 1994 |

# 2. EGS TEST VERSION OVERVIEW

## *2.1 Required Capabilities*

The EGS Test Version is an early EOSDIS delivery intended to provide the capability to test interfaces supporting the TRMM Mission and to verify the ability to conduct basic ingest of external data at the supporting DAACs. To support TRMM, EOSDIS is required to:

- Provide interfaces for product and algorithm transfer between the GSFC DAAC and the LIS SCF.
- Provide an interface for product and algorithm transfer between the Langley Research Center (LaRC) DAAC and the Clouds and Earth's Radiant Energy System (CERES) instrument SCF.
- At the GSFC DAAC, accept LIS Level 0 products, quick look products, and orbit and attitude data from the SDPF.
- At the LaRC DAAC, accept CERES Level 0 products, quick look products, and orbit and attitude data from the SDPF.
- Provide interfaces for products, algorithms, documentation, ancillary data and related information between the TRMM Science Data and Information System (TSDIS) and the GSFC DAAC.

To support AM-1, the EOSDIS is required to:

- Provide an interface for science software I&T between the Earth Resources Observation System (EROS) Data Center (EDC) DAAC and the Advanced Spaceborne Thermal Emission and Reflection Radiometer (ASTER) SCF.

EOSDIS must provide a connection to the NASA Science Internet (NSI) to support NSI connectivity to the GSFC, LaRC, and EDC DAACs, and the System Monitoring and Coordination Center (SMC).

## *2.2 The Test Version EOS Ground System*

The EGS Test Version interfaces are depicted in a simplified form in Exhibit 2-1. The only EOSDIS components supporting the Test Version are the ECS IR-1 release and the V0 system. ECS IR-1 is installed at each of the GSFC, LaRC, and EDC DAACs.

IR-1 sub-systems provided at each DAAC include basic ingest and archive capabilities (through the Data Archive and Distribution Service) and limited data interfaces into Scientific Data Processing (SDP). The SDP data interfaces will support early verification of data flows supporting production algorithm I&T. See Exhibit 2-2 for a DAAC functional diagram. Note that this exhibit represents a complete DAAC and includes elements not present in the test version system.

Elements external to EOSDIS supporting the EGS Test Version are the SDPF and NSI. Connectivity between the SDPF and the LaRC and GSFC DAACs is provided through EOSDIS circuits connected to the EBnet using the current V0 network. Connectivity between TSDIS and the GSFC DAAC will be provided via EBnet using the current V0 network. Connectivity

between the, EDC, GSFC and LaRC DAACs and the, ASTER, LIS and CERES SCFs respectively is provided by NSI.

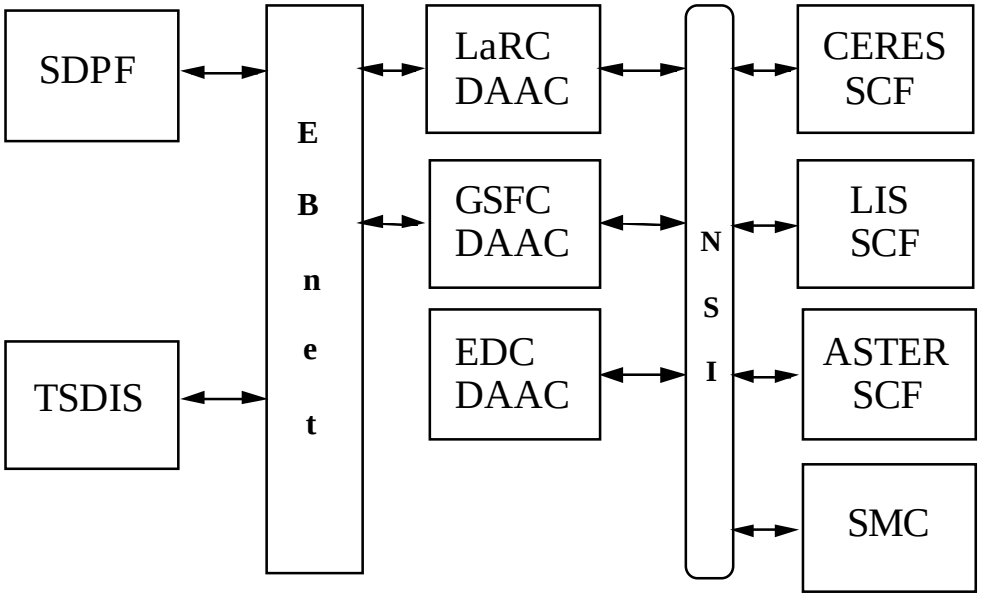


**EXHIBIT 2 - 1: EGS Test Version Overview**

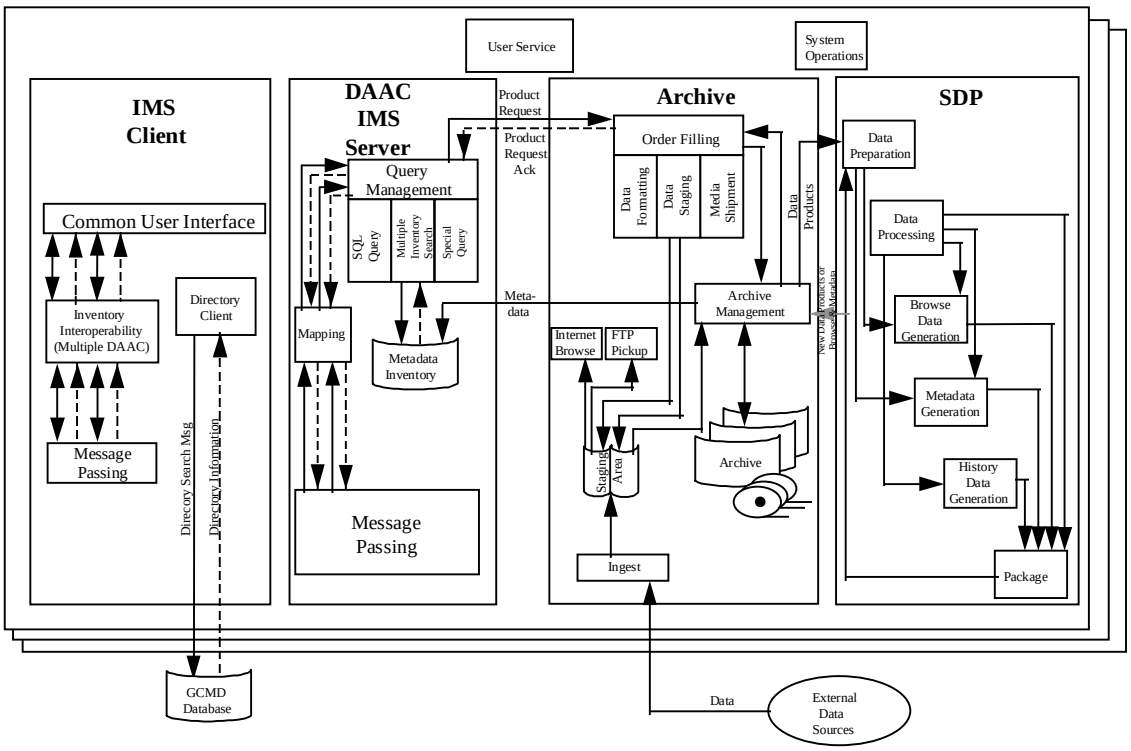


**EXHIBIT 2 - 2: DAAC Functional Diagram (fully functional release B DAAC)**

# 3. EGS TEST VERSION I&T PROGRAM OVERVIEW

These assumptions are implicit in the following discussion:

1. EBnet connectivity is available on 15 Mar 96 for testing.
2. Code 540 has established connectivity between SDPF - GSFC by 15 Mar 96.
3. Code 540 has established connectivity between SDPF - LaRC by 22 Mar 96.
4. Code 540 has established connectivity between TSDIS - GSFC by 17 May 96.

The EGS Test Version integration program consists of eight external interface tests, and two functional thread tests:

Priority 1:

EXT06 - ECS - NSI Interface Test

EXT07 - ECS - EBnet Interface Test

Priority 2:

EXT01 - GSFC DAAC - LIS SCF Interface Test

EXT02 - LaRC DAAC - CERES SCF Interface Test

EXT03 - SDPF - GSFC DAAC Interface Test

EXT04 - SDPF - LaRC DAAC Interface Test

EXT05 - TSDIS - GSFC DAAC Interface Test

FT01 - Data Ingest Functional Thread Test

FT02 - Science Software Support Functional Thread Test (everywhere but EDC)

Priority 3:

EXT08 - EDC DAAC - ASTER SCF Interface Test

FT02 - Science Software Support Functional Thread Test (at the EDC)

Tests EXT06 and EXT07 are listed as the top priority for the I&T of the Test Version as they test necessary connectivity for all other interface testing. Due to their importance and the current questions concerning EBnet, they are listed as separate tests to provide visibility for these interfaces. These tests may be folded into the appropriate DAAC interface test execution as prerequisites.

## *3.1 EGS Test Version Master Schedule Mapping*

The ESDIS Systems Management Office (SMO) has developed a series of Level 2 and Level 3 test schedules covering all areas of EGS I&T for each version. In successively greater levels of detail, the schedules allot Level 2 and Level 3 test windows for EGS I&T activities. The interface and functional thread tests are mapped to the test windows provided in the Level 3 EGS I&T

Master Schedule, and some TSDIS tests are candidates for joint testing as described in paragraph 4.12.

Actual test cases and descriptions are discussed in greater detail in section 4.

## *3.2 Test Dependencies*

The test execution order dependencies are reflected in the Level 2 and Level 3 Master Schedules. Interface tests that are pre-requisites to other tests, are scheduled first. Interface tests include tests for simple connectivity as well as Level 3 requirements validation. Tests for connectivity support interface tests which support functional thread tests. The execution order dependencies reflect this cumulative increase in complexity as EGS I&T progresses. Specifically for the EGS Test Version, the ECS - NSI interface test (EXT06) establishes connectivity and is executed prior to the ECS - SCF interface tests (EXT01, EXT02 and EXT08 ). The ECS - EBnet interface (EXT08) is a prerequisite for the ECS - SDPF (EXT03, EXT04), and ECS - TSDIS (EXT05) tests. These dependencies are illustrated in Exhibit 3-1.

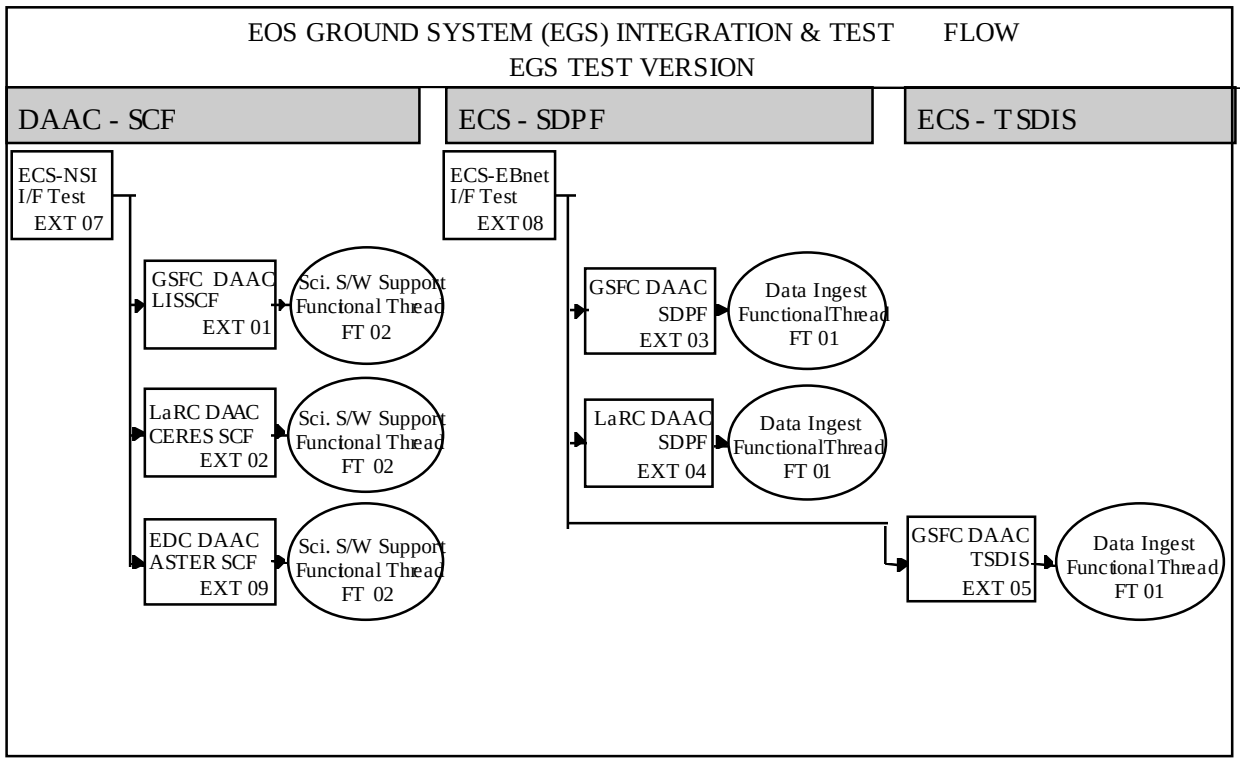


**EXHIBIT 3 - 1: Test Case Dependencies**

Upon completion of required interface tests, functional thread testing can begin. For the EGS Test Version there are two independent functional threads. These threads may be exercised immediately after their respective interfaces have been validated.

Also shown in Exhibit 3-1 are the functional thread testing relationships. FT01 will be run three different times following completion of each external interface test EXT03, EXT04, and EXT05. FT02 will be run three different times following completion of each external interface test EXT01, EXT02 and EXT08.

## *3.3 Schedule of Pre- and Post-Test Activities*

The I&T Test window is found in the current version of the ESDIS SMO EGS I&T Master Schedules. In support of the I&T test program the EGS I&T Team performs the pre- and post-test activities depicted in Exhibit 3-2. Also shown is the relative flow of the EGS I&T test program.

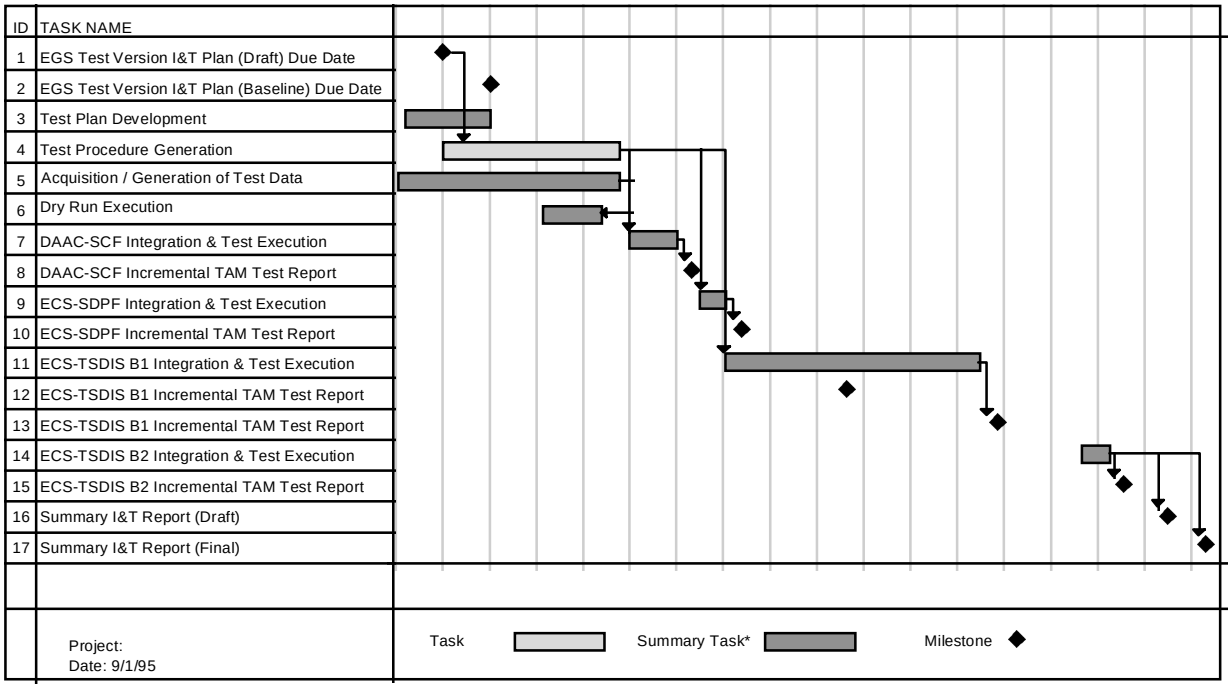


**EXHIBIT 3 - 2: Relative Schedule Of Pre- And Post-Test Activities**

The process guiding Level 4 schedule development is given in section 2 of the EGS I&T Plan (EOSVV 1102). The schedule is updated as necessary throughout the test execution period using MS-Project. It will be updated and maintained on the SI&T home page later this year.

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# 4. TEST DESCRIPTIONS

## *4.1 EXT01 - GSFC DAAC to LIS SCF Interface Test*

Test Objectives:

The objectives of this test are to:

- Verify that the Commercial Off-the-shelf (COTS) infra-structure for electronic mail, secure and non-secure file transfer, and World Wide Web (WWW) access has been correctly installed and configured.
- Verify that LIS L1 - L4 products can be successfully transferred from the GSFC DAAC to the LIS SCF, and
- Verify that LIS production algorithms can be transferred from the LIS SCF to the GSFC DAAC.

Requirements Verified:

DADS0190, EOSD1750, EOSD1760, PGS-0610, PGS-0620, PGS-0900, PGS-1030, SCF-0001, SCF-0040, SCF-0050, SCF-0060, SCF-0070, SCF-0080, SCF-0100, SCF-0110, SCF-0120, SCF-0330, SDPS0090

Test Configuration:

(See Exhibit 4-1)

Support Requirements:

a. Institutional Support

NASA Science Internet (NSI)

b. Personnel Support

Maintenance & Operations (M&O) personnel at GSFC DAAC

LIS SCF operations personnel

I&T Test Conductor (TC)

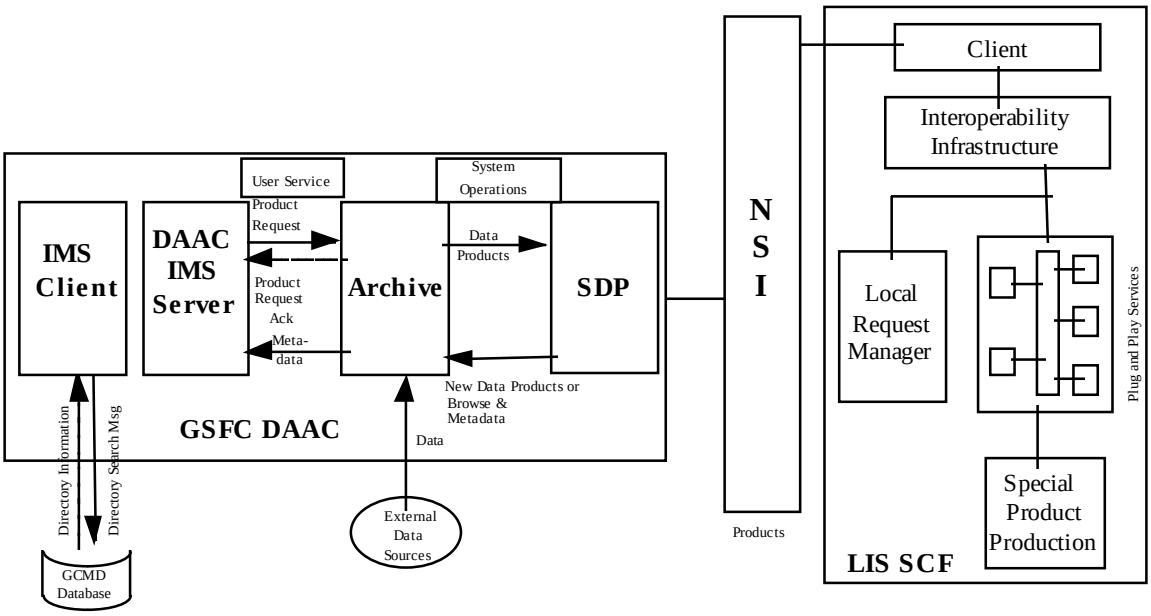


**EXHIBIT 4 - 1: GSFC DAAC - LIS SCF Interface Test**

c. Test Data Descriptions

| Description / Characteristics | Source |
|---|---|
| Nominal LIS L1 Products<br>LIS01 - LIA Product<br>LIS02 - Background Images Product<br>LIS03 - Events Product<br>LIS04 - Group Product | LIS Instrument Team |
| Nominal LIS L2 Products<br>LIS05 - Flash Product<br>LIS06 - Area Product<br>LIS07 - Orbit Product | LIS Instrument Team |
| Nominal LIS L3 Products<br>LIS08 - Vector Product<br>LIS09 - Browse Product | LIS Instrument Team |
| Nominal LIS L4 Products<br>LIS10 - L4 Product | LIS Instrument Team |

d. Communications:

Telephone

e. Test Tools:

**TBD**

Test Cases:

**EXT01.1** Verify COTS support for communications

[Note - this test case should be performed first]

The designated operations accounts (**TBD**) at the LIS SCF and the GSFC DAAC will exchange e-mail messages.

Test files will be exchanged by file transfer protocol (ftp) transfer between the designated operational accounts.

Test files will be exchanged by Kerberos file transfer protocol (kftp) between the designated operational accounts.

A GSFC DAAC user will access the LIS SCF WWW site.

A LIS SCF user will access the GSFC DAAC WWW site.

The following error handling conditions for the ftp/kftp standard protocols will be exercised:

Network failure

Unable to establish ftp connection

host denied access

file(s) not found

ftp failure - too many errors in transfer

fail post transfer double check

ftp command error

**EXT01.2** L1 - L4 LIS Product Transfer

The GSFC DAAC will produce Data Availability Notices (DANs) on machine (**TBD**) at Internet Protocol (IP) address (**TBD**), for each level of product and e-mail them to the LIS SCF (Machine / IP Address / Account - **TBD**).

LIS SCF operations will read the e-mail. Files for transfer will be (manually or automatically from DAN parsing - DAAC operations scenarios - **TBD**) designated for transmission from the GSFC DAAC via kftp. Kftp of the files will be initiated from the LIS SCF.

LIS SCF operations will monitor the kftp transfer and verify successful completion.

**EXT01.3** LIS Algorithm Transfer to GSFC

LIS SCF operations will form a DAN for a Data Production Software Delivery Package on (Machine / Account **TBD**) and e-mail it to the GSFC DAAC (Machine / Account - **TBD**)

GSFC DAAC operations will receive and parse the DAN (manually or automatically - **TBD**). Files for transfer will be designated for kftp transfer from the SCF to the GSFC DAAC (Machine / Directory / Account - **TBD**). GSFC DAAC operations will monitor the transfer and verify successful completion.

## *4.2 EXT02 - LaRC DAAC to CERES SCF Interface Test*

Test Objectives:

The objectives of this test are to:

- Verify that the COTS infra-structure for electronic mail, secure and non-secure file transfer, and WWW access has been correctly installed and configured.
- Verify that CERES L1 - L4 products can be successfully transferred from the LaRC DAAC to the CERES SCF, and
- Verify that CERES production algorithms can be transferred from the CERES SCF to the LaRC DAAC.

Requirements Verified:

DADS0190, EOSD1750, EOSD1760, PGS-0610, PGS-0620, PGS-0900, PGS-1030, SCF-0001, SCF-0040, SCF-0050, SCF-0060, SCF-0070, SCF-0080, SCF-0100, SCF-0110, SCF-0120, SCF-0330, SDPS0090

Test Configuration:

(See Exhibit 4-2)

Support Requirements:

a. Institutional Support

NASA Science Internet (NSI)

b. Personnel Support

M&O personnel at LaRC DAAC

CERES SCF operations personnel

I&T TC

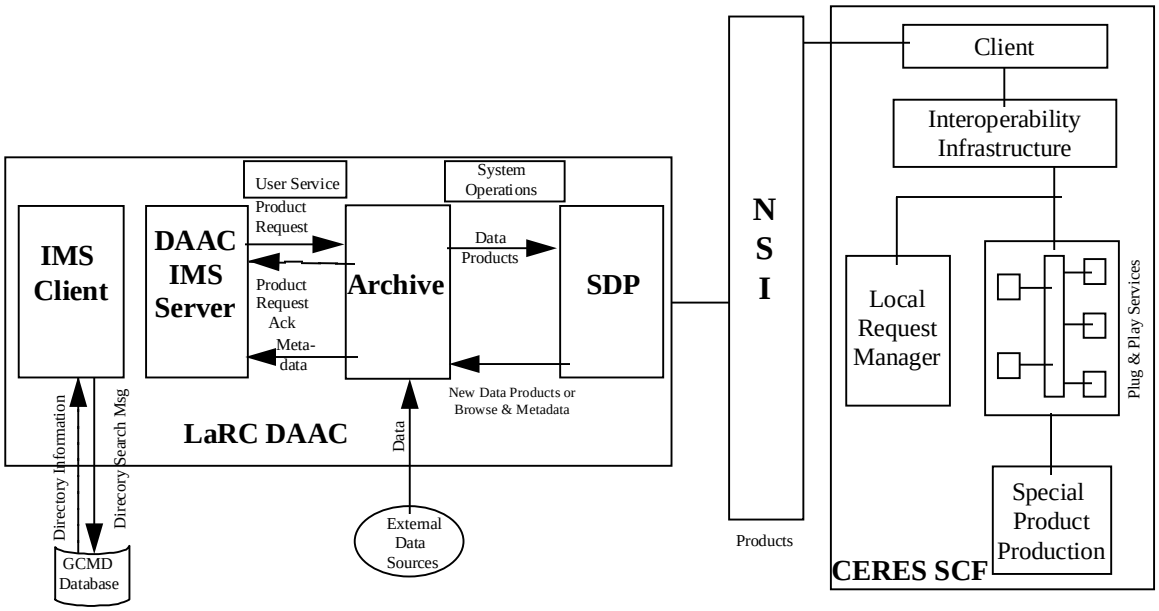


**EXHIBIT 4 - 2: LaRC DAAC - CERES SCF Interface Test**

c. Test Data Descriptions

| Description / Characteristics | Source |
|---|---|
| Nominal CERES L1 Products<br>CER01 - Bi-directional Scan Product<br>CER09 - Single Satellite Instrument Earth Scan Product | CERES Instrument Team |
| Nominal CERES L2 Products<br>CER02 - ES8 - ERBE - Like Science Product<br>CER011 - Single Satellite TOA Fluxes | CERES Instrument Team |
| Nominal CERES L3 Products<br>CER03 - ES9 - ERBE - Like Product<br>CER013 - ES4 - ERBE - Like Product<br>CER014 - ES46 - ERBE - Like Product<br>CER05 - Hourly Single satellite Flux<br>CER07 - Synoptic Cloud Radiation Data Product<br>CER08 - Regional Monthly Average Data Product<br>CER015 - Zonal & Global Monthly Data Product | CERES Instrument Team |

| Description / Characteristics | Source |
|---|---|
| CER012 - Surface & TOA<br>CER06 - Monthly & Regional Flux Data Product<br>CER016 - Clear Reflectance and Temperature History | |

d. Communications:

Voice:

**TBD**

e. Test Tools:

**TBD**

Test Cases:

**EXT02.1** Verify COTS support for communications

[Note - this test case should be performed first]

The designated operations accounts (**TBD**) at the CERES SCF and the LaRC DAAC will exchange e-mail messages.

Test files will be exchanged by ftp transfer between the designated operational accounts.

Test files will be exchanged by kftp between the designated operational accounts.

A LaRC DAAC user will access the CERES SCF WWW site.

A CERES SCF user will access the LaRC DAAC WWW site.

The following error handling conditions for the ftp/kftp standard protocols will be exercised:

Network failure

Unable to establish ftp connection

host denied access

file(s) not found

ftp failure - too many errors in transfer

fail post transfer double check

ftp command error

**EXT02.2** L1 - L4 CERES Product Transfer

The LaRC DAAC will produce DANs on machine (**TBD**) at IP address (**TBD**), for each level of product and e-mail them to the CERES SCF (Machine / IP Address / Account - **TBD**).

CERES SCF operations will read the e-mail message. Files for transfer will be (manually or automatically from DAN parsing - DAAC operations scenarios - **TBS**) designated for

transmission from the LaRC DAAC via Kerberos file transfer protocol (kftp). Kftp of the files will be initiated from the CERES SCF.

CERES SCF operations will monitor the kftp transfer and verify successful completion.

**EXT02.3** CERES Algorithm Transfer to LaRC

CERES SCF operations will form a DAN for a Data Production Software Delivery Package on (Machine / Account **TBD**) and e-mail it to the LaRC DAAC (Machine / Account - **TBD**)

LaRC DAAC operations will receive and parse the DAN (manually or automatically - **TBD**). Files for transfer will be designated for kftp transfer from the SCF to the LaRC DAAC (Machine / Directory / Account - **TBD**). LaRC DAAC operations will monitor the transfer and verify successful completion.

## *4.3 EXT03 - SDPF to GSFC DAAC Interface Test*

Test Objectives:

The objective of this test is to verify that LIS Level 0 and Quick Look Data sets and associated ancillary data (orbit and attitude data files) can be transferred from the SDPF to the GSFC DAAC. Proper implementation of interface error handling and exception processing will also be verified.

Requirements Verified:

DADS0130, DADS1070, DADS1380, DADS1400, DADS1607, EOSD1607, SDPS0020, SDPS0080, SDPS0110, TRMM2010, TRMM2020, TRMM2030, TRMM2190, TRMM2220, TRMM2270

Test Configuration:

(See Exhibit 4-3)

Support Requirements:

a. Institutional Support

   Sensor Data Processing Facility (Data Distribution Facility (DDF) Element)

b. Personnel Support

   SDPF (DDF) Operations personnel

   GSFC DAAC M&O personnel

   I&T TC

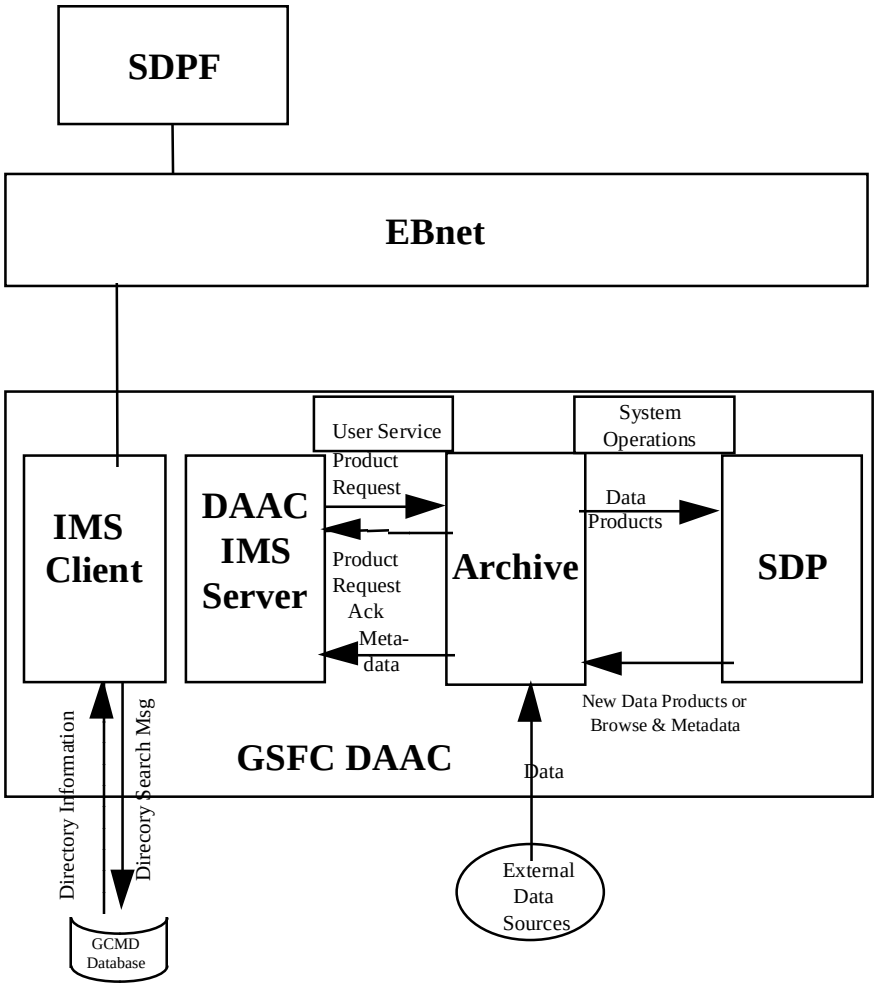


**EXHIBIT 4 - 3: SDPF - GSFC DAAC Interface Test**

c. Test Data Descriptions:

| Description / Characteristics | Source |
|---|---|
| SDPF DAN (**or series of DANs -TBD**) with errors / invalid entries in all validated fields (See Test Case EXT03.1) | SDPF Data Distribution Facility (DDF) DDF Simulator (DESIM) |
| Nominal LIS L0 product | LIS Instrument Team |
| Nominal LIS Quick-Look product | LIS Instrument Team |
| Series of 5 LIS products (3 L0 and 2 Quick-Look) to be placed into the DDF distribution queue in quick succession | LIS Instrument Team |
| TRMM Orbit & Attitude Data Products - **TBD** | FDF |
| Series of invalid authentication requests: (See Test Case EXT03.1) | |

d. Communications:

Voice: SDPF - GSFC DAAC (Circuit - **TBD)**

Data: SDPF(**machine - TBD**) connects to EBnet at (**port / socket / - TBD**)

**TBD** circuits / routers connect SDPF to GSFC DAAC (LAN / NET **- TBD**) (machine / port - **TBD**)

e. Test Tools:

**TBD**

Test Cases:

**EXT03.1** Error and Exception Handling

The GSFC DAAC will initiate a valid authentication request and response exchange with the SDPF and verify that the connection has been made. The connection will then be broken.

The GSFC DAAC will transmit the following invalid authentication requests to the SDPF and verify that permission to connect is rejected:

Invalid Message Type

Message length parameter does not match actual message length

Invalid source system code

Invalid destination system code

Invalid User ID

Invalid Password

The SDPF will transmit DANs with the following errors to the GSFC DAAC and verify that the error is reported in the DAA received from the GSFC DAAC:

(Short DAA reports)

Invalid consumer control system ID

Invalid DAN sequence number

Invalid Project ID

Invalid Mission ID

Invalid consumer file system ID

Invalid file count

Invalid data service

EDOS Data Unit (EDU) label error

DAN label error

Invalid DAN length

Invalid aggregate length

(Long DAA Reports)
Invalid data type

Invalid distribution criteria

Invalid descriptor

Invalid directory

Invalid time stamp format

Invalid generation time format

Invalid file size field

Invalid short title ID

Invalid time/data format

Proper values for these parameters are specified in Tables 4-3 and 4-6 of the SDPF TRMM consumer ICD.

**EXT03.2** LIS Product Transfers

SDPF will transmit a DAN for a single nominal LIS L0 product to the GSFC DAAC. The DAAC will respond with a DAA and initiate the transfer. SDPF (DDF) and the DAAC will monitor the transfer and verify successful completion.

SDPF will transmit a DAN for a single nominal LIS Quick-look product to the GSFC DAAC. The DAAC will respond with a DAA and initiate the transfer. SDPF (DDF) and the DAAC will monitor the transfer and verify successful completion.

SDPF will send five DANs in quick succession to the GSFC DAAC to initiate the transfer of five products to the GSFC DAAC. The DAAC will verify that five products are in the ingest queue. SDPF (DDF) and the DAAC will monitor the transfer and verify successful completion.

SDPF will send (**TBD**) DANs to the GSFC DAAC to initiate transfer of set TRMM orbit and attitude data products. The DAAC will respond with a DAA for each product. SDPF (DDF) and the DAAC will monitor the transfer and verify successful completion.

## *4.4 EXT04 - SDPF to LaRC DAAC Interface Test*

Test Objectives:

The objective of this test is to verify that CERES Level 0 and Quick Look Data sets and associated ancillary data (orbit and attitude data files) can be transferred from the SDPF to the LaRC DAAC. Proper implementation of interface error handling and exception processing will also be verified.

Requirements Verified:

DADS0130, DADS1380, DADS1400, EOSD1607, SDPS0020, SDPS0080, SDPS0110, TRMM1010, TRMM1020, TRMM1030, TRMM1060, TRMM1080, TRMM1200, TRMM1210, TRMM1280

Test Configuration:

(See Exhibit 4-4)

Support Requirements:

a. Institutional Support

   Sensor Data Processing Facility (Data Distribution Facility Element)

b. Personnel Support

   SDPF (DDF) Operations personnel

   LaRC DAAC M&O personnel

   I&T TC

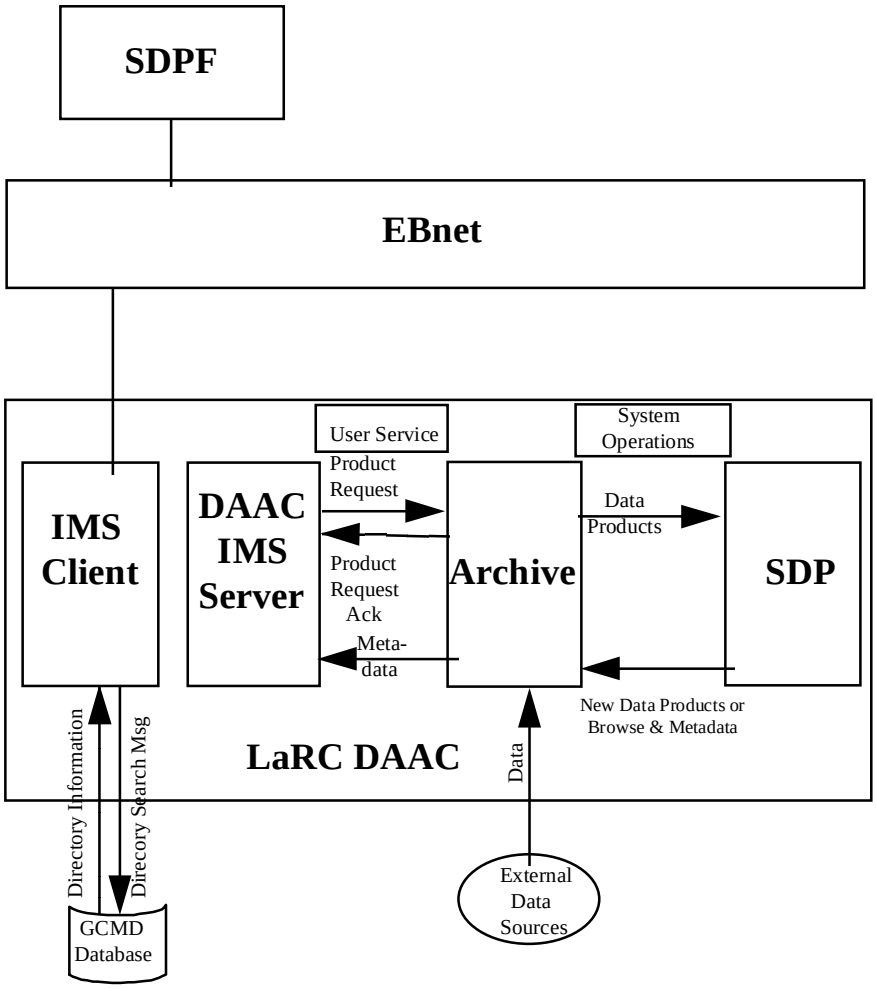


**EXHIBIT 4 - 4: SDPF to LaRC DAAC Interface Test**

c. Test Data Descriptions:

| Description / Characteristics | Source |
|---|---|
| SDPF DAN (**or series of DANs**) with errors / invalid entries in all validated fields (See Test Case EXT04.1) | SDPF (DDF) / DESIM |
| Nominal CERES L0 Product | CERES Instrument Team |
| Nominal CERES Quick-Look Product | CERES Instrument Team |
| Series of 5 CERES Products (3 L0 and 2 Quick-Look) to be placed into the DDF distribution queue in quick succession | CERES Instrument Team |
| TRMM Orbit & Attitude Data / Planning Aids<br>- Predicted Sun Position<br>- Moon in Field-of-View (FOV) | FDF |

| Description / Characteristics | Source |
|---|---|
| Series of invalid authentication requests:<br>(See Test Case EXT04.1) | |

d. Communications:

Voice: SDPF - LaRC DAAC (Circuit **TBD)**

Data: SDPF connects to EBnet at (port / socket **/ - TBD**)

**TBD** circuits / routers connect SDPF to LaRC DAAC (LAN / NET **- TBD**) (machine / port - **TBD**)

e. Test Tools:

**TBD**

Test Cases:

**EXT04.1** Error and Exception Handling

The LaRC DAAC will initiate a valid authentication request and response exchange with the SDPF and verify that the connection has been made. The connection will then be broken.

The LaRC DAAC will transmit the following invalid authentication requests to the SDPF and verify that permission to connect is rejected:

Invalid Message Type

Message length parameter does not match actual message length

Invalid source system code

Invalid destination system code

Invalid User ID

Invalid Password

The SDPF will transmit DANs with the following errors to the LaRC DAAC and verify that the error is reported in the DAA received from the LaRC DAAC:

(Short DAA reports)

Invalid consumer control system ID

Invalid DAN sequence number

Invalid Project ID

Invalid Mission ID

Invalid consumer file system ID

Invalid file count

Invalid data service

EDU label error

DAN label error

Invalid DAN length

Invalid aggregate length

(Long DAA Reports)
Invalid data type

Invalid distribution criteria

Invalid descriptor

Invalid directory

Invalid time stamp format

Invalid generation time format

Invalid file size field

Invalid short title ID

Invalid time/data format

Proper values for these parameters are specified in Tables 4-3 and 4-6 of the SDPF - TRMM Consumer ICD.

**EXT04.2** CERES Product Transfers

SDPF will transmit a DAN for a single nominal CERES L0 product to the LaRC DAAC. The DAAC will respond with a DAA and initiate the transfer. SDPF (DDF) and the DAAC will monitor the transfer and verify successful completion.

SDPF will transmit a DAN for a single nominal CERES Quick-look product to the LaRC DAAC. The DAAC will respond with a DAA and initiate the transfer. SDPF (DDF) and the DAAC will monitor the transfer and verify successful completion.

SDPF will send five DANs in quick succession to the LaRC DAAC to initiate the transfer of five products to the LaRC DAAC. The DAAC will verify that five products are in the ingest queue. SDPF (DDF) and the DAAC will monitor the transfer and verify successful completion.

SDPF will send (**TBD**) DANs to the LaRC DAAC to initiate transfer of set TRMM orbit and attitude data products. The DAAC will respond with a DAA for each product. SDPF (DDF) and the DAAC will monitor the transfer and verify successful completion.

## *4.5 EXT05 - TSDIS to GSFC DAAC Interface Test*

Test Objectives:

The objective of this test is to verify that the TSDIS - GSFC DAAC interface can support the data flows required by the Visible Infrared Scanner (VIRS) instrument team. These flows are summarized below:

From TSDIS to the GSFC DAAC

- VIRS Products and metadata
- Updated metadata
- VIRS Browse Products
- VIRS Algorithms and Documentation
- VIRS Product Orders, Status and Cancellation Requests
- TMI, PR, and GV Products and metadata
- Combined product and metadata files
- TMI, PR, and GV Browse Products
- TMI, PR, and GV Algorithms and Documentation
- Product Orders, Status and Cancellation Requests
- Directory and Guide information
- Product Schedules and Delayed Product Status

From the GSFC DAAC to TSDIS

- Product Status Requests
- VIRS products for re-processing
- Ancillary data
- Platform ephemeris data
- Delayed Product Status
- Product Status Requests
- TMI, PR, and GV products for re-processing
- Combined products for re-processing

Error and exception handling will also be exercised.

Requirements Verified:

DADS0170, DADS1070, DADS1380, DADS1400, EOSD1607, SDPS0080, TRMM3010, TRMM3020, TRMM3030, TRMM3040, TRMM3050, TRMM3120, TRMM4010, TRMM4020, TRMM4030, TRMM4040, TRMM4110, TRMM4120, TRMM5010, TRMM5030

Test Configuration:

(See Exhibit 4-5)

Support Requirements:

a. Institutional Support

**TBD**

b. Personnel Support

TSDIS Operations Personnel

GSFC DAAC M&O Personnel

I&T TC

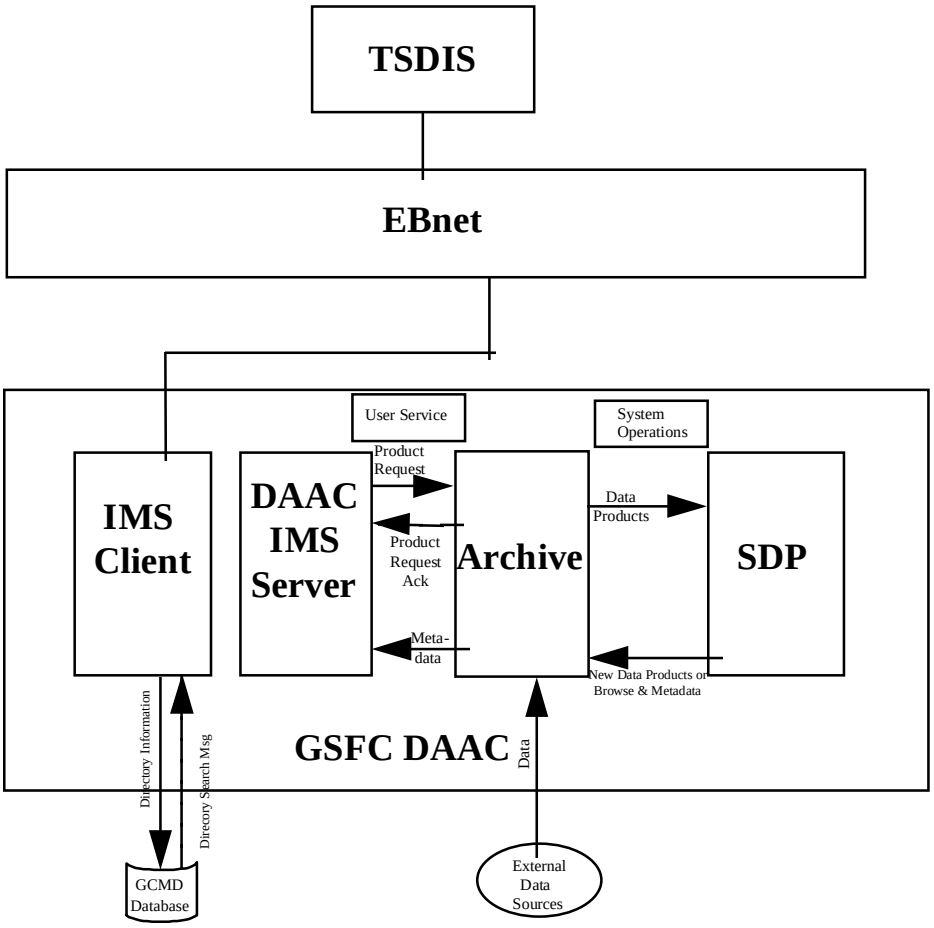


**EXHIBIT 4 - 5: TSDIS to GSFC DAAC Interface Test**

c. Test Data Descriptions:

| Description / Characteristics | Source |
|---|---|
| Nominal VIRS Product Set and associated metadata (Specific Products -**TBD**) | VIRS Instrument Team |
| Updated metadata set. To modify some of the metadata supplied with nominal product set | VIRS Instrument Team |
| Nominal VIRS Browse product set | VIRS Instrument Team |
| VIRS Algorithm & Documentation files - can be dummy files - do not need to | TSDIS / I&T Team |

| Description / Characteristics | Source |
|---|---|
| contain actual code or documentation. | |
| TRMM platform ephemeris files / Planning Aids<br>- Sun in FOV of VIRS Solar Collection Door<br>- Moon in FOV of VIRS Space Calibration Point | FDF |
| Ancillary data file for VIRS application | VIRS Instrument Team |
| DAN (or series of DANs) with errors<br>(See Test Case EXT05.10) | TSDIS |
| TSDIS Product Schedule<br>(Can be dummy file) | TSDIS |
| Nominal TMI, PR and GV Product Sets and associated metadata<br>TMI - L1A - L3A<br>GV - L2A - L3A<br><br>(Specific Products -**TBD**) | TRMM Instrument Team / Investigators |
| Combined product and metadata files | TRMM Instrument Team / Investigators |
| Updated metadata set. To modify some of the metadata supplied with EXT06-A | TRMM Instrument Team / Investigators |
| Nominal TMI, PR GV and combined Browse product sets | TRMM Instrument Team / Investigators |
| TMI, PR, GV and combined Algorithm & Documentation files - can be dummy files - do not need to contain actual code or documentation. | TSDIS / I&T Team |
| Ancillary data file for TMI / PR application | **(TBD)** |
| TSDIS Product Schedule<br>(Can be dummy file) | TSDIS |

d. Communications:

Voice: **(**Circuit **- TBD)**

Data: Network - circuit configuration (EBnet) is still **TBD**.

e. Test Tools:

**TBD**

Test Cases:

General Note: Authentication sequences may be performed automatically upon initializing the communications processes on each side. If the interface has been initialized, it may not be necessary to explicitly perform an authentication sequence.

**EXT05.1** Nominal VIRS Product and metadata transfer to GSFC DAAC

TSDIS will perform an authentication sequence with the GSFC DAAC and deliver DANs for a set of VIRS Level 1A and Level 1B products and the associated metadata. The GSFC DAAC will respond with corresponding DAA messages and initiate a kftp transfer of the designated files. TSDIS and the GSFC DAAC will monitor the transfer and verify successful completion, including DDN and DDA exchange. The GSFC DAAC product directory will be queried to verify successful parsing of the metadata file and database updating.

**EXT05.2** Updated metadata file transfer to GSFC

[EXT05.1 must be performed before EXT05.2]

TSDIS will perform an authentication sequence with the GSFC DAAC and deliver a DAN for an updated metadata file to the GSFC DAAC. The GSFC DAAC will respond with the corresponding DAA messages and initiate a kftp transfer of the designated file. TSDIS and the GSFC DAAC will monitor the transfer and verify successful completion, including DDN and DDA exchange. The GSFC DAAC product directory will be queried to verify successful parsing of the metadata file and database updating.

**EXT05.3** VIRS Browse product transfer to GSFC

TSDIS will perform an authentication sequence with the GSFC DAAC and deliver a DAN for a Browse Product to the GSFC DAAC. The GSFC DAAC will respond with the corresponding DAA messages and initiate a kftp transfer of the designated file. TSDIS and the GSFC DAAC will monitor the transfer and verify successful completion, including DDN and DDA exchange. **[How do we verify that the browse product came through in a form that can be read by the browsing software? What are the major pieces of the browse function?]**

**EXT05.4** VIRS Algorithm and Documentation transfer to GSFC

**[This is a COTS function (anonymous ftp and web site access) - worth testing?]**

**EXT05.5** Platform ephemeris / ancillary data transfer from GSFC DAAC to TSDIS.

TSDIS will send Data Requests to the GSFC DAAC for TRMM ephemeris products and ancillary data supporting the VIRS instrument team. The DAAC will respond with the corresponding DRA.

**[IT'S NOT CLEAR FROM THE ICD WHAT HAPPENS NEXT! IS IT THE SAME IDEA AS THE DAN/DAA kftp sequence GOING THE OTHER WAY?]**

TSDIS and the GSFC DAAC will monitor the transfer and verify successful completion.

**EXT05.6** Product retrieval from ECS to TSDIS

TSDIS will submit a product order (data request) for an input product for re-processing. The GSFC DAAC will respond with a DRA.

**[Again - it's not clear from the ICD how this exchange works and what causes a data request to be invalid]**

Before request completion (**how is that controlled?**), TSDIS will submit a cancellation request and the GSFC DAAC will return a cancellation message and remove the request from the distribution queue.

TSDIS will submit a product order (data request) for an input product for re-processing. The GSFC DAAC will respond with a DRA.

Before request completion, TSDIS will transmit a status request to the GSFC DAAC. The DAAC will respond with a status message.

TSDIS and the DAAC will monitor the transfer and verify successful completion.

**EXT05.7** Error and Exception handling

(TSDIS - ECS Transfers)

The GSFC will initiate a valid authentication request and response exchange with the TSDIS and verify that the connection has been made. The connection will then be broken.

The GSFC DAAC will transmit the following invalid authentication requests to the TSDIS and verify that permission to connect is rejected:

Invalid Message Type

Message length parameter does not match actual message length

Invalid origination system ID

Invalid destination system ID

Invalid User ID

Invalid Password

The TSDIS will transmit DANs with the following errors to the GSFC DAAC and verify that the error is reported in the DAA received from the GSFC DAAC:

(Short DAA reports)

Invalid DAN sequence number

Invalid Mission ID

Invalid file count

Invalid data service

EDU label error

DAN label error

Invalid DAN length

Invalid aggregate length

Duplicate DAN

(Long DAA Reports)

Invalid data type

Invalid descriptor

Invalid directory

Invalid file size field

Invalid time/data format

Invalid version number

Invalid node name

Invalid file type

Proper values for these parameters are specified in Tables 4-4 and 4-5 of the ECS - TSDIS ICD.

(ECS - TSDIS Transfers)

**(Not addressed in the ICD when the transfers go this way)**

**EXT05.8** Product Schedule (TSDIS - ECS) and Delayed Product Status (both ways)

**(TBD - how these data flows get implemented is TBD in the ICD)**

**EXT05.9** TMI, PR, GV and Combined product and metadata transfer to GSFC

TSDIS will perform an authentication sequence with the GSFC DAAC and deliver DANs for a set of TMI, PR, Combined, and GV products and the associated metadata. The GSFC DAAC will respond with corresponding DAA messages and initiate a kftp transfer of the designated files. TSDIS and the GSFC DAAC will monitor the transfer and verify successful completion, including DDN and DDA exchange. The GSFC DAAC product directory will be queried to verify successful parsing of the metadata file and database updating.

**EXT05.10** Platform ephmeris / ancillary data to TSDIS

TSDIS will send a Data Request to the GSFC DAAC for TRMM ephemeris products and ancillary data supporting the TMI and PR instrument. The DAAC will respond with the corresponding DRA.

**[It's not clear from the ICD what happens next! Is it the same idea as the DAN/DAA kftp sequence going the other way ?]**

TSDIS and the GSFC DAAC will monitor the transfer and verify successful completion.

**EXT05.11** TMI, PR, GV and Combined browse product transfer to GSFC

TSDIS will perform an authentication sequence with the GSFC DAAC and deliver DANs for a browse product to the GSFC DAAC. The GSFC DAAC will respond with the corresponding DAA messages and initiate a kftp transfer of the designated files. TSDIS and the GSFC DAAC will monitor the transfer and verify successful completion, including DDN and DDA exchange. [How to verify that the browse product came through in a form that can be read by the browsing software? What are the major pieces of the browse function?]

**EXT05.12** TMI PR, GV and Combined Algorithm and Documentation transfer to GSFC

[This is a COTS function (anonymous ftp and web site access) - worth testing?]

## *4.6 EXT06 - ECS to NSI Interface Test*

Test Objectives:

The objective of this test is to verify that the ECS - NSI connections necessary to support the ECS - TSDIS interfaces are in place and functioning. This test may be conducted in conjunction with the first ECS - TSDIS test as opposed to being a separately scheduled test.

**[Note: The current state of the ECS-NSI ICD precludes further detailed planning as of 10/03/95]**

Requirements Verified:

SDPS0020, SDPS0080

Test Configuration:

(See Exhibit 4-6)

Support Requirements:

a. Institutional Support

   NSI

b. Personnel Support

   NSI network operations / network manager

   GSFC DAAC M&O personnel

   LaRC DAAC M&O personnel

   EDC DAAC M&O personnel

   GSFC ECS/SMC M&O personnel

   GSFC EDC M&O personnel

   I&T TC

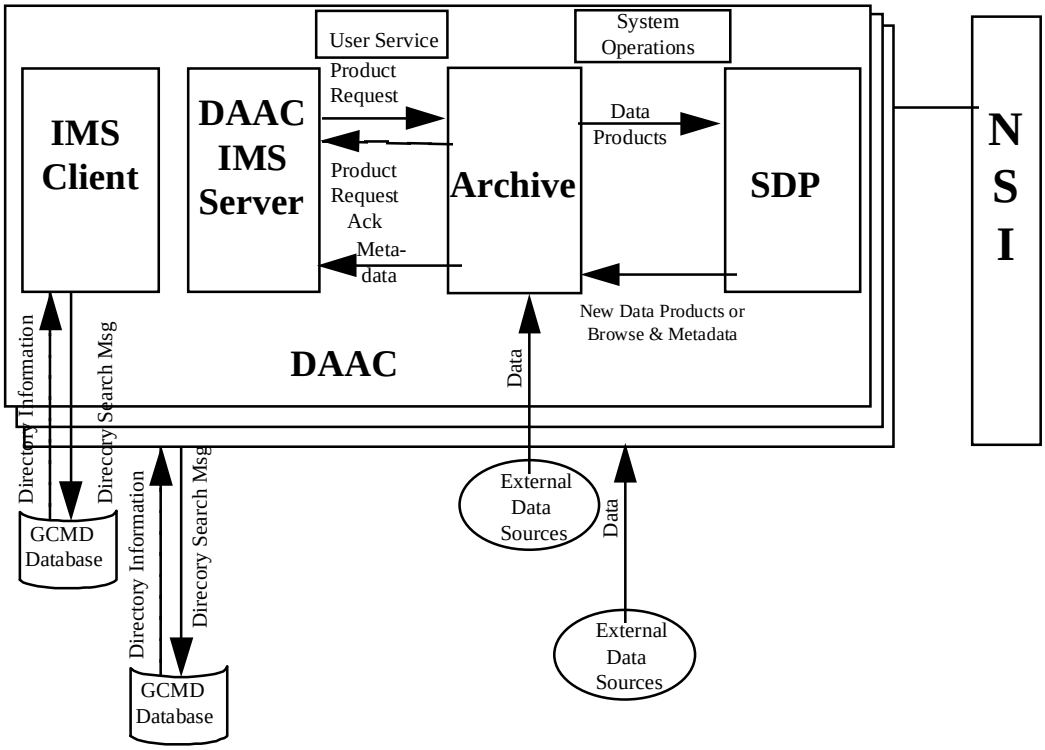


**EXHIBIT 4 - 6: ECS to NSI Interface Test**

c. Test Data Descriptions:

**TBD**

d. Communications:

**TBD**

e. Test Tools:

**TBD**

Test Cases:

**EXT06.1** Management message exchange

**EXT06.2** GSFC connections (DAAC, SMC, EDC)

**EXT06.3** LaRC DAAC Connection

**EXT06.4** EDC DAAC Connection

### *4.7 EXT07 - ECS to EBnet Interface Test*

(See Exhibit 4-7)

This test may be conducted in conjunction with the ECS - SCF tests as opposed to being a separately scheduled test. Placed in the document for visibility of the EBnet **TBD** issue.

Test will be further defined when EBnet ICD is available.

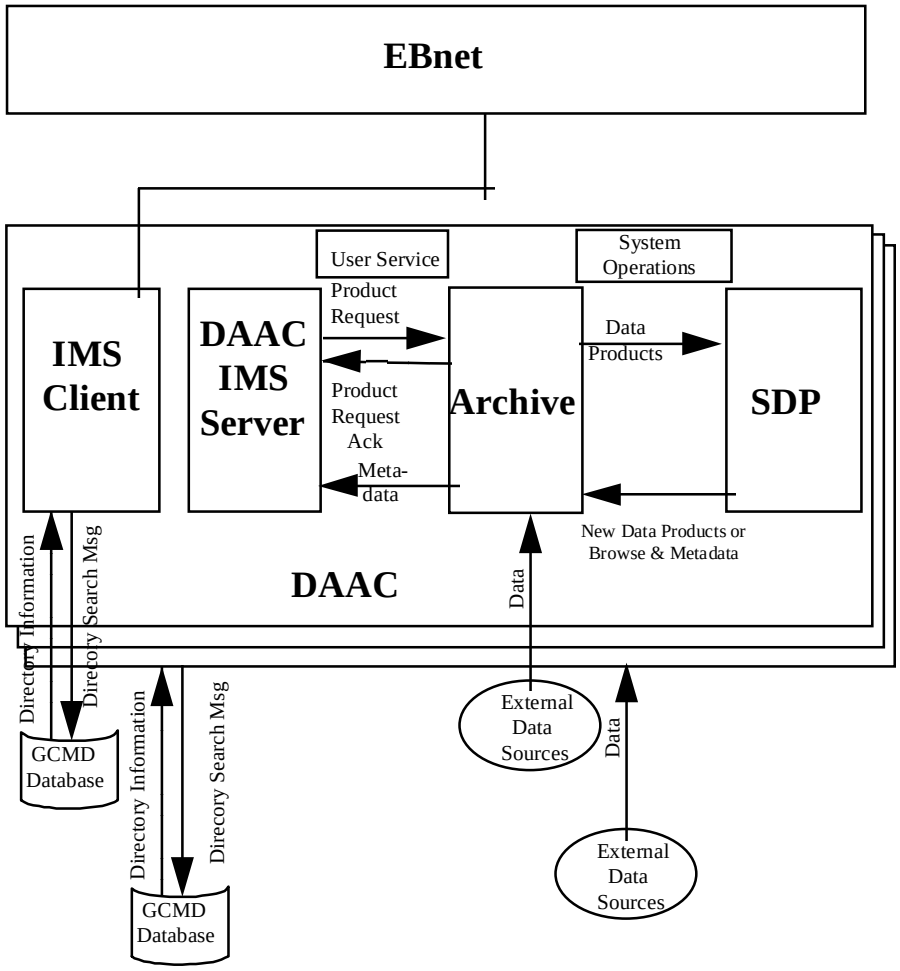


**EXHIBIT 4 - 7: ECS to EBnet Interface Test**

## *4.8 EXT08 - EDC DAAC to ASTER SCF Interface Test*

Test Objectives:

The objectives of this test are to:

- Verify that the Commercial Off-the-shelf (COTS) infra-structure for electronic mail, secure and non-secure file transfer, and World Wide Web (WWW) access has been correctly installed and configured.
- Verify that ASTER production algorithms can be transferred from the ASTER SCF to the EDC DAAC.

Requirements Verified:

DADS0190, EOSD1750, EOSD1760, PGS-0610, PGS-0620, PGS-0900, PGS-1030, SCF-0001, SCF-0040, SCF-0050, SCF-0060, SCF-0070, SCF-0080, SCF-0100, SCF-0110, SCF-0120, SCF-0330, SDPS0090

Test Configuration:

(See Exhibit 4-8)

Support Requirements:

a. Institutional Support

NSI

b. Personnel Support

M&O personnel at EDC DAAC

ASTER SCF operations personnel

I&T TC

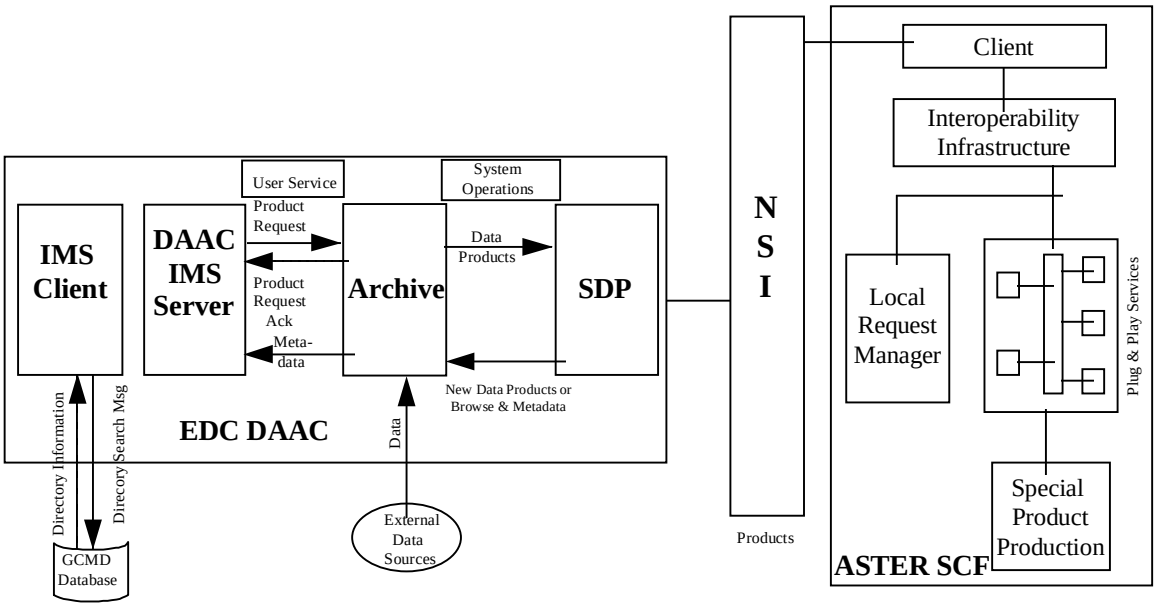


**EXHIBIT 4 - 8: EDC DAAC - ASTER SCF Interface Test**

c. Test Data Descriptions

| Description / Characteristics | Source |
|---|---|
| ASTER Data Production Software Delivery Package | ASTER Instrument Team |

d. Communications:

Voice:

**TBD**

e. Test Tools:

**TBD**

Test Cases:

**EXT08.1** Verify COTS support for communications

[Note - this test case should be performed first]

The designated operations accounts (**TBD**) at the ASTER SCFs and the EDC DAAC will exchange e-mail messages.

Test files will be exchanged by ftp between the designated operational accounts.

Test files will be exchanged by kftp between the designated operational accounts.

An EDC DAAC user will access the ASTER SCF WWW site.

An ASTER SCF user will access the EDC DAAC WWW site.

The following error handling conditions for the ftp/kftp standard protocols will be exercised:

Network failure

Unable to establish ftp connection

host denied access

file(s) not found

ftp failure - too many errors in transfer

fail post transfer double check

ftp command error

**EXT08.2** ASTER Algorithm Transfer to EDC

ASTER SCF operations will form a DAN for a Data Production Software Delivery Package on (Machine / Account **TBD**) and e-mail it to the EDC DAAC (Machine / Account - **TBD**)

EDC DAAC operations will receive and parse the DAN (manually or automatically - **TBD**). Files for transfer will be designated for kftp transfer from the SCF to the EDC DAAC (Machine / Directory / Account - **TBD**). EDC DAAC operations will monitor the transfer and verify successful completion.

### *4.09 FT01 - Data Ingest Functional Thread Test*

Test Objectives:

The objectives of this test are to exercise the DAAC ingest and archiving functions in an operational manner, verifying that the user interface is correctly implemented. Metadata generation upon archiving, and metadata file ingest will be verified. This test will be conducted at the GSFC, and LaRC DAACs. DAAC operational scenarios to guide detailed test planning are being developed by the DAACs.

Requirements Verified:

DADS0145, DADS0260, EOSD1608, EOSD1710, SDPS0010, SMC-3305

Test Configuration:

(See Exhibit 4-9)

Support Requirements:

a. Institutional Support

**TBD**

b. Personnel Support

GSFC DAAC M&O personnel

LaRC DAAC M&O personnel

I&T TC

c. Test Data Descriptions:

| Description / Characteristics | Source |
|---|---|
| Set of **(TBD)** external ingest data sets | **TBD** |
| Set of **(TBD)** metadata files for ingest | **TBD** |

d. Communications:

Voice: **TBD**

Data: **TBD**

e. Test Tools:

**TBD**

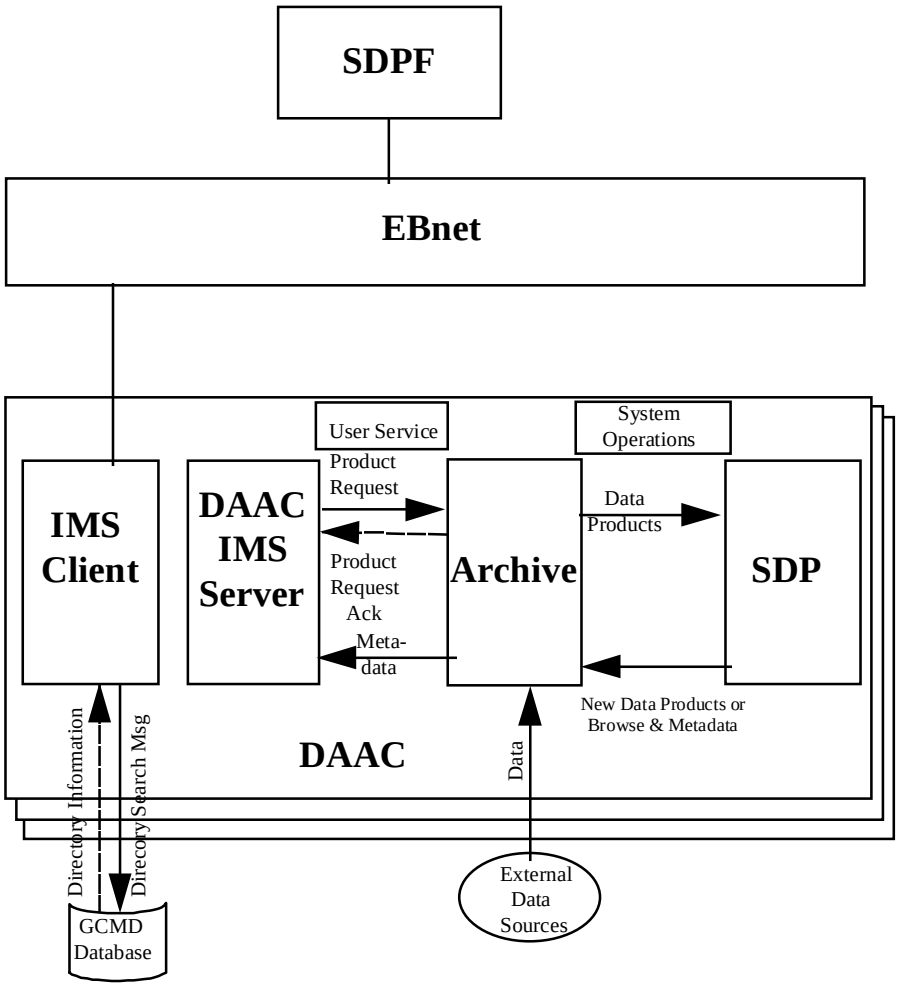


**EXHIBIT 4 - 9: Data Ingest Functional Thread Test**

Test Cases:

**FT01.1** Ingest Graphic User Interface (GUI) Validation

The ingest GUI will be modeled and exercised as a state machine. When user documentation becomes available, each state (display or processing function) of the GUI and each transition from one state to another will be identified. All transitions will be exercised.

**FT01.2** External Data Ingests (V0, Ancillary Data)

Test data set FT01-A will be queued for ingest from the ingest GUI. Ingest will be initiated and progress monitored via the GUI. Archiving of the data in the archive directories will be verified. When ingest is complete, the DAAC archive catalog will be queried to output each field expected to be populated upon external archive data ingest. Proper metadata population will then be verified.

**FT01.3** Metadata ingest

Test data set FT01-B will be queued for ingest from the ingest GUI. Ingest will be initiated and progress monitored via the GUI. When ingest is complete, the DAAC archive catalog will be queried to output each field expected to be populated upon metadata file ingest. Proper metadata population will then be verified.

## *4.10 FT02 - Science Software Support Functional Thread Test*

Test Objectives:

The objective of this test is to verify that the DAAC infrastructure to support the integration of science software with the DAAC production systems is present in the test version. Science software will be transferred to the DAACs from the SCFs, run through the coding standards check and compiled. The error logging capability of the PGS will be exercised. The PGS Toolkit will be validated and the I&T GUI will be exercised. This test will be conducted at each of the GSFC, EDC, and LaRC, DAACs. DAAC operational scenarios to guide detailed test planning are being developed by the DAACs.

Requirements Verified:

EOSD0502, EOSD1703, PGS-0360, PGS-0490, PGS-0602, PGS-0640, PGS-0650, PGS-0860, PGS-0920, PGS-0925, PGS-0940, PGS-0970, PGS-0980, PGS-0990, PGS-1000, PGS-1010, PGS-1015, PGS-1020, PGS-1025, SMC-3305

Test Configuration:

(See Exhibit 4-10)

Support Requirements:

a. Institutional Support

None

b. Personnel Support

GSFC DAAC M&O personnel

LaRC DAAC M&O personnel

EDC DAAC M&O personnel

SCF operations / investigator personnel

I&T TC

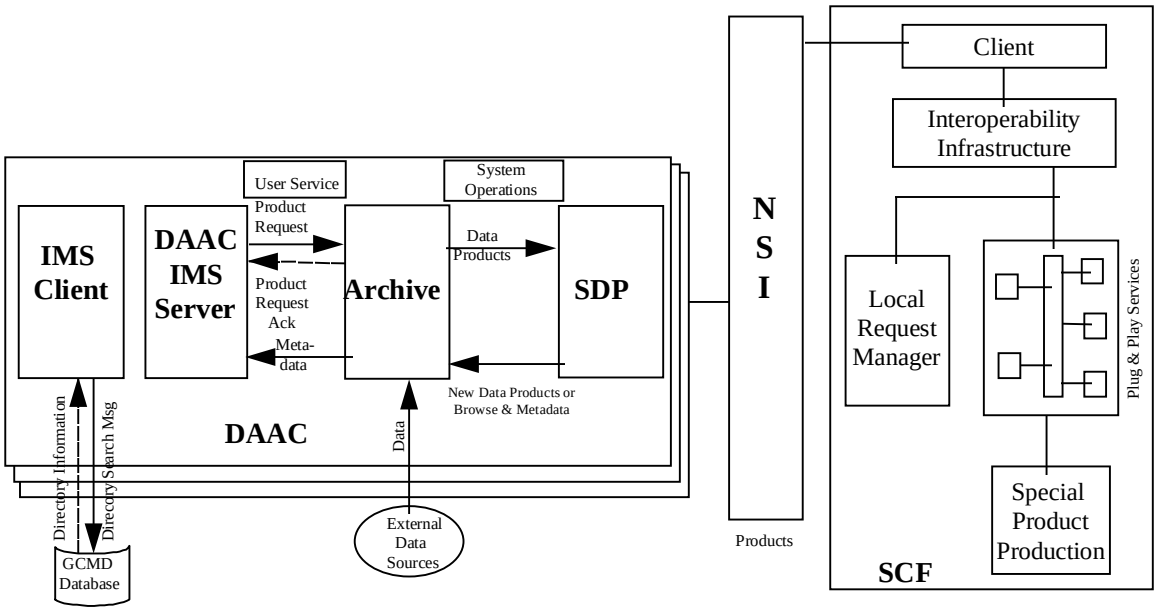


**EXHIBIT 4 - 10: Science Software Support Functional Thread Test**

c. Test Data Descriptions:

| Description / Characteristics | Source |
|---|---|
| Nominal LIS algorithm for transfer to GSFC DAAC | LIS instrument team |
| Nominal CERES algorithms for transfer to the LaRC DAAC. | CERES instrument team |
| CERES algorithms violating coding standards for transfer to the LaRC DAAC. **(Need to exercise coding standards checkers for each language in use at the DAAC - TBD)** | CERES instrument team |
| Nominal VIRS algorithms for transfer to the GSFC DAAC. | VIRS instrument team |
| Nominal ASTER algorithms for transfer to the EDC DAAC | ASTER instrument team |
| Sample code in Ada exercising all PGS toolkit calls | **TBD** |

d. Communications:

Voice: **TBD**

Data: **TBD**

e. Test Tools:

**TBD**

Test Cases:

**FT02.1** PGS Error Logging

**(TBD - need to determine what errors get logged in IR-1)**

**FT02.2** I&T GUI validation

The I&T GUI will be modeled and exercised as a state machine. When user documentation becomes available, each state (display or processing function) of the GUI and each transition from one state to another will be identified. All transitions will be exercised.

## *4.12 ESDIS - TRMM Project Joint Testing*

### 4.12.1 Overview

One of the main purposes of the IR-1 release of the ECS is to provide software and hardware to support the integration of EOSDIS with the TRMM Ground System (TGS). This section will:

- Provide an overview description of tests planned by the TRMM Project integrating the TGS with EOSDIS and requiring ECS support.
- Identify areas of overlap between the test objectives of the TRMM related tests in this plan and the test objectives of the TRMM Project. This will be the starting point for the negotiation of joint testing efforts between the EOSDIS Project and the TRMM Project.
- Establish ground rules for the management and execution of joint test efforts.

### 4.12.2 TRMM Project Test Programs

The TRMM Project administers the integration and testing efforts as shown in Exhibit 4-11.

Additionally, informal, developer -to-developer integration efforts requiring ECS developer support may be requested as needed by the TRMM Project and coordinated by the ECS Integration Manager.

| Effort | Responsible Organization | Focus | Scenarios / Tests Requiring ECS Support |
|---|---|---|---|
| TSDIS Build Acceptance Tests<br><br>(Executed for each TSDIS Build) | GSC / CTA<br><br>(TSDIS Systems Engineering) | Verification of TSDIS Requirements | A3 - Process TRMM Instrument Data<br>A4 - Reprocessing<br>A5 - Orders and Product Delivery<br>A8 - Daily Operations<br><br>C5 - Process Orders<br>C8 - EOSDIS Ingest<br>C9 - Transfer to EOSDIS<br><br>S3 - Process TRMM Instrument Data<br>S4 - Orders and Data Delivery |

| | | | |
|---|---|---|---|
| | | | S7 - TSDIS Normal Mode Operations<br>S8 - TSDIS Contingency Mode Operations |
| TRMM Ground Segment Integration and Certification Tests | TRMM Ground Data Processing Manager | Integration of TGS elements with each other and external systems, including EOSDIS.<br><br>These tests may be executed in conjunction with or as part of TRMM Mission Readiness Testing | I&C A - Process TRMM Instrument Data<br>I&C B- Reprocess TRMM Instrument and GV Data<br>I&C C - TSDIS/EOSDIS Data Product Orders and Delivery<br>I&C F - TGS End-End Test |
| TRMM Mission Readiness Tests | TRMM Mission Readiness Manager | TGS readiness for mission support in the operational environment | I&T 3 - Science Data Processing<br>I&T 7 - Fully Integrated Ground Data System |
| TRMM Operations Test | TRMM Operations Manager | Operational readiness of systems, personnel and procedures | TRMM S/C first hard-line data flow<br>First TDRSS R/F ETE Data Flow<br>Mission Simulation 1<br>Mission Simulation 2 |

**Exhibit 4-11: TRMM Project Testing**

### 4.12.3 Overlapping Objectives

Areas of overlapping test objectives between the tests planned by the TRMM Project and those planned by the EOSDIS I&T Project are shown in Exhibit 4-12. To make most efficient use of resources and minimize disruption to both the TGS and EOSDIS development efforts, TRMM tests and EGS I&T tests will be conducted jointly whenever possible. The goal of joint testing efforts is to make most efficient use of resources while meeting the test objectives of both projects. Guidelines for the selection, coordination, scheduling, execution and documentation of joint test efforts are provided in the next section.

### 4.12.4 Management of Joint Test Efforts

This section defines the mechanisms for selecting, coordinating and scheduling joint tests and the roles and responsibilities of lead and support organizations.

#### 4.12.4.1 Joint Test Selection and Coordination

The EOSDIS Project will provide a representative, usually the EOSDIS TRMM Mission Coordinator, to the TRMM Mission Readiness Manager's regular test meetings. Similarly, the TRMM Project will provide a representative to the ESDIS Integration Team Meetings. Selection of Joint Tests and the designation of lead and support organizations may be made at these meetings or negotiated directly between the EOSDIS TRMM Mission Coordinator and the TRMM Project.

#### 4.12.4.2 Scheduling

The ECS Integration Manager maintains an EOSDIS / TRMM Mission Integration Schedule. All TRMM Mission tests involving the ECS, whether joint tests or tests conducted solely by one project or the other will be carried on this schedule. The schedule and the overlapping objectives will be regularly reviewed at the integration team meetings to both identify opportunities for joint testing and to track test preparation progress.

#### 4.12.4.3 Roles and Responsibilities

For each joint test, the ESDIS and TRMM projects will agree on who will be the lead organization and the supporting organization.

| TGS I&C | TSDIS A & IT | | TRMM M/R | TRMM OPS | EGS I&T |
|---|---|---|---|---|---|
| Verify COTS infrastructure for DAAC - SCF I/F | | | | | EXT01,02 |
| Transfer algorithms to DAAC | | | | | EXT01,02 |
| Transfer products to SCF | | | | | EXT01,02 |
| Transfer L0 & Q/L from SDPF - DAAC | | I&C "A"<br>I&C "F" | I&T 3 (SDP)<br>I&T 7 (FIGDS) | TRMM S/C first hard-line data flow<br>First RF E-E<br>Mission Sim 1<br>Mission Sim 2 | EXT03,04 |
| Transfer ancillary data from SDPF - DAAC | | I&C "F" | I&T 7 (FIGDS) | Mission Sim 2 | EXT03,04 |
| DAAC - SDPF interface errors | "A" scenarios | | | | EXT03,04 |
| Transfer products & metadata TSDIS - DAAC | Scenario A3, A4,A5 A8, C9,S3,S4,S7 | I&C "F" | | Mission Sim 2 | EXT05 |
| Transfer products for reprocessing to TSDIS | Scenario A4, C5,C8,S7 | I&C "B"<br>I&C "F" | | Mission Sim 2 | EXT05 |
| Transfer ancillary & ephemeris data DAAC - TSDIS | S7 | I&C "F" | | Mission Sim 2 | EXT05 |
| Exercise product ordering interface | Scenario A5, S7 | I&C "C"<br>I&C "F" | | Mission Sim 2 | EXT05 |
| Browse product generation | | I&C "A"<br>I&C "B"<br>I&C "F" | | Mission Sim 2 | |
| Metadata generation | | I&C "A"<br>I&C "B"<br>I&C "F" | | Mission Sim 2 | |

**EXHIBIT 4-12: Overlapping TRMM and EOSDIS Test Objectives**

The **lead organization** will have the following responsibilities:

- Generation of test plans and procedures
- Collection or generation of test data
- Providing the test conductor for test execution
- Scheduling and coordinating resources (systems, personnel, etc.) assigned to their (TRMM or ESDIS) project, and providing requests for supporting resources from the support organization's project
- Scheduling and coordinating support from NASA institutional elements (NASCOM, SN, FDF, etc.)
- Reporting test results to their project.

The **supporting organization** will have the following responsibilities:

- Development, technical review and comment to test plans and procedures, as required to insure that the supporting project's objectives are met by the test.
- Providing assistance in the collection or generation of test data.
- Providing an associate conductor or witness for the test execution.
- Scheduling and coordinating resources (systems, personnel, etc.) assigned to their (TRMM or ESDIS) project
- Reporting test results to their project.

# Appendix A - TRACEABILITY AND VERIFICATION

Test Method: I - Inspection, A - Analysis, D-Demonstration, T-Test

| Traceability and Verification | | | | | | | |
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| **Paragraph ID** | **Requirement Text** | **Clarification** | **Test Case ID** | **Test Method** | | | |
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| DADS0130 | Each DADS shall receive from the SDPF, at a minimum, the following:<br>a. Production data (L0) | Receive TRMM (CERES & LIS)<br>L0. Applies only to ingest and temporary storage for testing purposes only. | EXT03.2<br>EXT04.2 | | | | X<br>X |
| DADS0145 | Each DADS shall be capable of receiving from the ADCs, at a minimum, the following for the purpose of product generation:<br>b. Metadata<br>c. Ancillary data | Applies only to ingest and temporary storage for testing purposes only. Testing of NESDIS and DAO interfaces. | FT01.2<br>FT01.3 | | | | X<br>X |
| DADS0170 | Each DADS shall be capable of receiving from designated EPDSs and ODCs, at a minimum, the following:<br>a. L0-L4 data sets<br>b. Metadata | IR-1: This requirement is supported as follows: IR-1 shall be capable of receiving and temporary storage of data from TSDIS for the purpose of testing the TSDIS interface to the Ingest subsystem. | EXT05.1<br>EXT05.9 | | | | X<br>X |
| DADS0190 | Each DADS shall receive from the SCF, at a minimum, the following:<br>g. Algorithms | IR-1: This requirement is supported as follows: IR-1 shall provide the capability for the SCF to transfer to the AITTL CI via ftp. | EXT01.3<br>EXT02.3<br>EXT08.2 | | | | X<br>X<br>X |
| DADS0250 | Each DADS shall receive, at a minimum, data in the following forms:<br>b. Electronic communications network | IR-1: This requirement is supported as follows: IR-1 shall have the capability to receive data via an electronic communications | N/A | X | | | |

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| | | network for the purpose of testing external interfaces to the Ingest subsystem. | | | | | |
| DADS0260 | Each DADS shall receive non-EOS correlative and ancillary digital data. | IR-1: This requirement is supported as follows: IR-1 shall have the capability to receive data from NOAA for the purpose of testing the NOAA interface to the Ingest subsystem. | FT01.2 | | | | X |
| DADS1070 | The DADS shall send data check and storage status to the provider of ingest data. | IR-1: This requirement is supported as follows: IR-1 shall report errors and status to TSDIS and SDPF in support of the testing of the ingest interfaces with TSDIS and SDPF. | EXT03.1<br>EXT04.1<br>EXT05.7 | | | | X<br>X<br>X<br>X |
| DADS1380 | Each DADS shall monitor data transfer between external (non-ECS) elements and the DADS. | IR-1: This requirement is supported as follows: IR-1 shall report errors and status to external elements in support of the testing of the data transfer interfaces with those elements. | EXT03.1<br>EXT04.1<br>EXT05.7 | | | | X<br>X<br>X<br>X |
| DADS1400 | Each DADS shall notify the originating source of the need to retransmit data in the event of transmission difficulties. | Applies only to ingest of TRMM data only. | EXT03.1<br>EXT04.1<br>EXT05.5 | | | | X<br>X<br>X<br>X |
| EOSD0500 | ECS shall perform the following major functions:<br>d. Communications and Networking<br>e. Data Input | IR-1: IR-1 shall perform the following major functions: | Too broadly stated to be mapped to individual | | | | |

| Traceability and Verification | | | | | | | |
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| | f. Data Processing | 1. Communications and networking utilizing existing VO networks.<br>2. Data input for the purpose of testing TRMM, NESDIS and DAO ingest interfaces.<br>3. Science software Integration and Test. | Test Cases. | | | | |
| EOSD0502 | ECS shall provide an integrated set of toolkits consisting of software tools for each ECS element. | IR-1: This requirement is supported as follows: IR-1 shall provide a PGS Toolkit and common CCS communication software. | Toolkits not being tested. | | | | |
| EOSD0510 | ECS shall be capable of being tested during all phases of its development . | IR-1: Applies only to the functions provided in this release. | Too broadly stated to be mapped to individual test case - to be demonstrated | | | X | |
| EOSD0730 | Each ECS element shall be capable of verifying the fidelity of the ECS element interface to:<br>b. Entities external to ECS at any time during the lifetime of the ECS | | Not testable as stated | | X | | |
| EOSD0780 | Each ECS element shall be capable of being monitored during testing. | | Not testable as stated | | | X | |
| EOSD1607 | ECS shall receive data from near term Earth Probe missions to include the following as a minimum:<br>a). TRMM data for temporary storage for testing purposes only. | IR-1: Applies only to ingest and temporary storage for testing purposes only (not archiving) of TRMM data. | EXT03.2<br>EXT04.2<br>EXT05.1<br>EXT05.9 | | | | X<br>X<br>X<br>X |
| EOSD1608 | ECS elements shall receive from EPDSs the following at a minimum:<br>a. Data products<br>e. Metadata | | FT01.2<br>FT01.3 | | | | X<br>X |
| EOSD1703 | ECS shall provide maintenance and operations interfaces to the DAACs to | IR-1: IR-1 shall provide a GUI | FT02.2 | | | | X |

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| | support the functions of:<br>b). Science Algorithm Integration | interface for displaying the operational state of managed objects in the AITTL CI. | | | | | |
| EOSD1710 | ECS elements shall exchange with ADCs/ODCs, such as NOAA and other data processing and archiving facilities, information including the following:<br>d. Science Data | | FT01.2 | | | | X |
| EOSD1750 | ECS elements shall receive data including the following types of supporting information from the ECS science community (TLs, TMs, PIs, and Co-Is):<br>a. Algorithms<br>b. Software fixes<br>d. Integration support requests | IR-1: Applies only to TRMM and AM-1 algorithms and algorithm I&T. | EXT01.3<br>EXT02.3<br>EXT08.2 | | | | X<br>X<br>X |
| EOSD1760 | The ECS elements shall send the following types of data at a minimum to the ECS science community (TLs, TMs, PIs, and Co-Is):<br>a. Software Problem Reports | IR-1: Applies only to TRMM and AM-1 algorithms. | EXT01.1<br>EXT02.1<br>EXT08.1 | | | | X<br>X<br>X |
| EOSD3200 | A minimum of one backup which is maintained in a separate physical location (i.e., different building) shall be maintained for ECS software. | | Verify in M&O SOPs | X | | | |
| EOSD5020 | ECS software, hardware, and interfaces shall enable transparent portability across heterogeneous site architectures, i.e. performing the same function at different ECS sites that may have different hardware implementations. | IR-1: Applies only to TRMM data ingest and algorithm I&T. | Demonstrated by interfaces to different DAACs | | | X | |
| ESN-0003 | The ESN shall enable researchers on existing networks (TCP/IP and GOSIP) to gain access to data and ECS services in a transparent manner to the underlying differences between the networks. | IR-1: V0 Network where possible; NSI otherwise<br>A: Applicable (w/0 GOSIP requirement and minimum connectivity to network for ftp to AI&T.) | | | | | |
| ESN-0006 | ESN shall interface with NSI to reach all external non-ECS network-attached facilities and science users. | IR-1:_TRMM and AM1 to SCFs | | | | | |
| ESN-0010 | ESN shall provide the following standard services:<br>a. Data Transfer and Management Services<br>b. Electronic Messaging Service<br>c. Remote Terminal Service | IR-1: a through h<br>a. ftp, etc.<br>b. mail<br>c. telnet<br>d. internal within a | | | | | |

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| | d. Process to Process Communication Service<br>e. Directory and User Access Control Service<br>f. Network Management Service<br>g. Network Security and Access Control Service<br>h. Internetwork Interface Services | site.<br><br>Issue on Network security and Access Control Service - item g?<br>Question: Item d. applicability; Carey Gire will check on this??? | | | | | |
| ESN-0070 | The ESN shall support the elements data flow requirements identified in this specification. | | | | | | |
| ESN-0210 | The ESN management function shall have a capability to obtain status on specific data flows to assure the successful operation of ESN. | | | | | | |
| ESN-0280 | The ESN shall provide file transfer and management service and as a minimum shall include the capability to transfer the following data types:<br>a. Unstructured Text<br>b. Binary Unstructured<br>c. Binary Sequential<br>d. Sequential Text | | | | | | |
| ESN-0290 | The file transfer and management service shall be available in interactive and non-interactive services. | | | | | | |
| ESN-0370 | The ESN shall provide interactive virtual terminal services. | IR-1:_Total applicability | | | | | |
| ESN-0620 | The ESN shall include a network management function to monitor and control the ESN. | | | | | | |
| ESN-0640 | The ESN shall include management functions at each ECS element, equipment or gateway within the ESN. | | | | | | |
| ESN-0650 | The ESN shall perform the following network management functions for each protocol stack implemented in any ECS element, and each communications facility:<br>a. Network Configuration Management<br>b. Network Fault Management<br>c. Network Performance Management<br>d. Network Security Management | | | | | | |
| ESN-0740 | The ESN network management service shall retrieve performance/fault data about ESN protocol stacks and equipment. | IR-1:_Total applicability | | | | | |
| ESN-0760 | The ESN report generation function shall provide, on an interactive and scheduled | IR-1:_interactive basis only. | | | | | |

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| **Paragraph ID** | **Requirement Text** | **Clarification** | **Test Case ID** | **Test Method** | | | |
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| | basis, network configuration, fault and performance management information. | | | | | | |
| ESN-0775 | The ESN management service shall have the capability to redirect its reports to different devices such as console, disk or printer. | IR-1:_Total applicability | | | | | |
| ESN-0790 | The ESN shall include the following configuration management functions at a minimum:<br>a. collect information describing the state of the network subsystem and its communications resources,<br>b. exercise control over the configuration, parameters, and resources of the subsystem, and over the information collected,<br>c. store the configuration information collected, and<br>d. display the configuration information. | As supported by V0 devices and policy. Otherwise not an IR-1 requirement. | | | | | |
| ESN-0800 | The ESN shall be capable of displaying the local network configuration status related to each system locally, and for all systems at the ESN network management facility. | IR-1:_Network Mgmt Facility @ EDF | | | | | |
| ESN-0830 | The ESN shall have the capability to detect and report communications related errors and events both locally and at the ESN network management facility. | | | | | | |
| ESN-0840 | The ESN shall have error reporting and event logging. | | | | | | |
| ESN-0900 | Errors and events to be detected shall include at least:<br>b. communications hardware errors<br>c. protocol errors<br>d. performance degradation conditions<br>e. telecommunications errors and failures | | | | | | |
| ESN-0910 | The ESN fault management shall provide the capability to perform the following functions, at a minimum, both locally and at the ESN network management facility:<br>c. enable and disable event reports within a system<br>d. manage error and event logging files | IR-1:_c and d | | | | | |
| ESN-1060 | The ESN performance management function shall provide the capability to evaluate the performance of ESN resources and interconnection activities. | IR-1:_Total applicability | | | | | |
| ESN-1070 | The ESN shall provide the capability to perform the following functions, at a minimum:<br>a. generate/collect network statistics | IR-1:_a through d. **TBD**? | | | | | |

| Traceability and Verification | | | | | | | |
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| | b. control collection/generation of network statistics<br>c. store system statistics and statistical histories<br>d. display the system statistics | | | | | | |
| ESN-1140 | The ESN shall provide protocol translation, termination, bridging and routing. | | | | | | |
| ESN-1170 | The ESN shall provide necessary translation within supported file transfer and e-mail services. | | | | | | |
| ESN-1180 | The ESN shall interoperate with NSI to provide user access to ECS. | | | | | | |
| ESN-1340 | The ESN shall provide support for TCP/IP communications protocols and services to external interfaces as required by the IRDs. | | | | | | |
| ESN-1350 | The ESN LANs shall provide physical devices and the corresponding medium access control (MAC) protocol compatible with ISO and ANSI standards. | | | | | | |
| NI-0400 | ECS shall have the capability to interface with NASA Data Processing Facilities (including the GSFC SDPF) via NOLAN to receive the following data (at a minimum):<br>a. Science data<br>b. Ancillary data<br>c. Orbit data | | | | | | |
| PGS-0270 | The PGS shall provide the capability to perform the following functions, at a minimum:<br>b. Suspend execution of tasks<br>c. Resume execution of a suspended task<br>d. Cancel execution of tasks | IR-1: Item b, c and d applicable to the extent that Unix commands or COTS can support execution operations. | Unix standard feature | X | | | |
| PGS-0360 | The PGS shall generate a PGS processing log that accounts for all data processing activities. | IR-1: This requirement is supported as follows: IR-1 shall provide the capability to record science processing event and history data to a log file, by means of both the SDP Toolkit and the CSS event logger service. | FT02.1 | | | | X |
| PGS-0370 | The PGS shall utilize the LSM to generate a PGS resource utilization report. | IR-1: This requirement is supported as | Can't be verified in the test version | | | | |

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| | | follows: IR-1 shall provide resource monitoring and reporting capabilities using the management framework at the EDF. IR-1 does not provide an LSM. | | | | | |
| PGS-0400 | The PGS shall have the capability to monitor the status of all algorithm and calibration coefficient testing and generate algorithm and calibration test reports. | IR-1 Total Applicability | Word processing and e-mail | X | | | |
| PGS-0430 | The PGS shall utilize the LSM to monitor and account for data and information transfer between it and other EOSDIS elements. | IR-1: This requirement is supported as follows: IR-1 shall provide network monitoring capabilities using the management framework at the EDF. IR-1 does not provide an LSM. | Can't be verified in the test version | | | | |
| PGS-0490 | The PGS shall have the capability to access and use, for the generation of Standard Products, information such as:<br>a. Digital terrain map databases<br>b. Land/sea databases<br>c. Climatology databases<br>d. Digital political map databases | | Toolkits not being tested. | | | | |
| PGS-0602 | The PGS shall have the capability to accept POSIX-compliant science algorithms and compile algorithm source code written in a standard programming language (e.g., Fortran, C, Ada). | IR-1: External Interface Requirement SCF-0010. | Toolkits not being tested. | | | | |
| PGS-0610 | The PGS shall accept from the SCFs new or modified calibration coefficients to be validated in the test environment. Calibration coefficients shall contain the following information at a minimum:<br>a. Identification of coefficient data set<br>b. Calibration coefficients values<br>c. Author and version number<br>d. Identification of related processing algorithm<br>e. Start and stop date/time of applicability<br>f. Date and time<br>g. SCF identification | IR-1: Applies to accepting information only, not using it. The Dataserver is incorporated in Release A. Dataserver is not available at IR-1. | EXT01.1<br>EXT02.1<br>EXT08.1 | | | | X<br>X<br>X |

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| | h. Reasons for update | | | | | | |
| PGS-0620 | The PGS shall have the capability to validate received calibration coefficients for completeness and correct format. | IR-1 TRMM and SCF | EXT01.1<br>EXT02.1<br><br>EXT08.1 | | | | X<br>X<br><br>X |
| PGS-0640 | The PGS shall accept from the SCF new or modified Standard Product algorithms to be tested at the processing facility. This software shall be received into the test environment and shall contain the following information at a minimum :<br>a. Algorithm identification<br>b. Algorithm source code<br>c. List of required inputs<br>d. Processing dependencies<br>e. Test data and procedures<br>f. Algorithm documentation | IR-1: Total Applicability | Toolkits not being tested. | | | | |
| PGS-0650 | The PGS shall have the capability to validate required operational algorithm characteristics prior to scheduling algorithm test time. These characteristics shall be include at a minimum:<br>a. Language<br>b. Operational impacts (e.g., algorithm software size, required resources)<br>c. Algorithm documentation<br>d. Data handling standards as appropriate<br>e. Units and models used<br>f. Operational compatibility<br>g. Required metadata outputs | | Toolkits not being tested. | | | | |
| PGS-0860 | The PGS shall have the capability to schedule and coordinate algorithm and calibration coefficient test time in the test environment with the appropriate SCF. | IR-1 Manual interaction (e.g. phone call). | Toolkits not being tested. | | | | |
| PGS-0900 | The PGS shall send test products to the SCF for analysis. These shall contain the results of algorithm testing and shall contain the following information at a minimum:<br>a. Algorithm identification<br>b. Test time(s)<br>c. Processor identification<br>d. Test results | IR-1: This requirement is supported as follows: IR-1 shall provide the capability to transfer files to the SCF via ftp. | EXT01.1<br><br>EXT02.1<br><br>EXT08.1 | | | | X<br><br>X<br><br>X |
| PGS-0910 | The PGS shall have the capability to support analysis of algorithm test results. | IR-1: Accomplished via comparison tools | File compare utility standard Unix feature | X | | | |
| PGS-0920 | The PGS shall have the capability to validate, through testing, that SCF | IR-1: Total applicability | Toolkits not being tested. | | | | |

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| | processing algorithms will execute properly in the operational environment. Validation shall include final compilation and linkage of the source code and testing to verify proper software execution in the operational environment based on indicated data and test results provided by the SCF and the investigator, but shall not include scientific validation of products. | The Dataserver is incorporated at Release A. | | | | | |
| PGS-0925 | The PGS shall validate algorithms used for conversions, calibrations and transformations of EOS engineering data. | | Toolkits not being tested. | | | | |
| PGS-0940 | The PGS shall provide storage for all candidate algorithms' software executables and calibration coefficients. | | Toolkits not being tested. | | | | |
| PGS-0950 | The PGS shall interface to the SMC to maintain configuration control of all algorithms and calibration coefficients used in operational Standard Product production. Controlled information shall contain at a minimum:<br>a. Source code including version number and author<br>b. Benchmark test procedures, test data, and results<br>c. Date and time of operational installation<br>d. Compiler identification and version<br>e. Final algorithm documentation | IR-1: Applies to local CM capability only, not SMC | Can't be verified in the test version | | | | |
| PGS-0970 | The PGS shall provide file access subroutines that enforce compliance with the adopted standard ECS formats. | IR-1: Total Applicability | Toolkits not being tested. | | | | |
| PGS-0980 | The PGS shall provide job control routines that provide all required task parameters to the Standard Product software. | | Toolkits not being tested. | | | | |
| PGS-0990 | The PGS shall provide error logging subroutines for use by Standard Product software in notifying the system operators of conditions requiring their attention. | IR-1: Total Applicability | FT02.1 | | | | X |
| PGS-1000 | The PGS shall provide error logging subroutines for use by Standard Product software in notifying users of conditions requiring their attention. | IR-1: Total applicability | FT02.1 | | | | X |
| PGS-1010 | The PGS shall provide mass storage allocation subroutines that provide algorithms with a means for dynamic allocation of storage for temporary files. | IR-1: Applies to staging storage only. | Toolkits not being tested. | | | | |
| PGS-1015 | The PGS shall provide ancillary data access subroutines that provide Standard Product software access to ephemeris data (e.g., | IR-1: Total applicability. | Toolkits not being tested. | | | | |

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| | solar, lunar, and satellite ephemeris ), Earth rotation data, and time and position measurement data. These subroutines shall perform operations such as:<br>a. Interpolation<br>b. Extrapolation<br>c. Coordinate system conversion | | | | | | |
| PGS-1020 | The PGS shall provide mathematical libraries including:<br>a. Linear algebra and analysis (e.g., LINPAC, IMSL)<br>b. Statistical calculations (e.g., SAS, SPSS) | IR-1: Total Applicability. | Toolkits not being tested. | | | | |
| PGS-1025 | The PGS shall provide a Science Processing Library containing routines such as:<br>a. Image processing routines<br>b. Data visualization routines<br>c. Graphics routines | IR-1: Science office believes items a, b, and c are in the toolkit(s). | Toolkits not being tested. | | | | |
| PGS-1030 | The PGS shall provide a toolkit to the SCF containing versions of the routines specified in requirements PGS-0970 to PGS-1020. | IR-1: External interface requirement SCF-0060. | EXT01.3<br><br>EXT02.3 | X<br><br>X | | | |
| PGS-1220 | The PGS shall have the capability to receive GFE databases and associated tools, including COTS and public domain databases, and maintain them as required as inputs to product generation: Example databases are:<br>a. Digital terrain map databases<br>b. Land/sea databases<br>c. Climatology databases<br>d. Digital political map databases | IR-1: Operations support - manual - M&O procedures. | Inspect documentation | X | | | |
| PGS-1315 | Each PGS shall have the capacity to support I/O to temporary and intermediate storage or multiple passes over input products as required by individual science algorithms. | IR-1: Applies only to disc capacity for staging and intermediate storage, not bandwidth. | | | | | |
| SCF-0001 | The SCF interface platform shall adhere to requirements specified in the Data Production Software and SCF Standards and Guidelines, GSFC 423-16-01. This standards document includes SCF requirements for operating system, computer communications, e-mail protocol, and windowing protocol. | External requirement: Information only. No action is required by ECS. | EXT01.1<br><br>EXT02.1<br><br>EXT08.1 | | | | X<br><br>X<br><br>X |
| SCF-0010 | The SCF interface shall consist of an ESDIS approved computing platform that shall have a C compiler. To access FORTRAN routines in the ECS Toolkits, the platform | External only requirement: Information only. | Verify platform selection compliance | X | | | |

| Traceability and Verification | | | | | | | |
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| | shall also have a FORTRAN compiler. | No action is required by ECS. | | | | | |
| SCF-0030 | The SCF interface platform shall have adequate computing resources for the storage, compilation, linking, and execution of ECS supplied software resident on the platform. | External only requirement: Information only. No action is required by ECS. | Verify platform selection compliance | | X | | |
| SCF-0040 | The ECS shall have the capability to send to the SCFs the Data Production Software Specification Requirements describing what is required for completing the Initial Data Production Software Specifications. | | EXT01.1<br>EXT02.1<br>EXT08.1 | | | | X<br>X<br>X |
| SCF-0050 | The ECS shall have the capability to accept from the SCF a set of Initial Data Production Software Specifications that provides the software design description and operations concepts of the data production software to be delivered and estimates storage and processing resources required for the data production software to operate successfully in the ECS operational environment. These specifications are described in the Data Production Software Specification Requirements. | IR-1: This requirement is supported as follows: IR-1 shall provide the capability for the SCF to transfer files to the AITTL CI via ftp. | EXT01.1<br>EXT02.1<br>EXT08.1 | | | | X<br>X<br>X |
| SCF-0060 | The ECS shall have the capability to provide to the SCF the Toolkit Delivery and Update Package. This package includes the PGS toolkit which supplies tools for the emulation of the ECS production environment and contains a ECS-standardized software routines to aid in science data production software development. | | EXT01.1<br>EXT02.1<br>EXT08.1 | | | | X<br>X<br>X |
| SCF-0070 | The ECS shall have the capability to provide Integration and Test Specifications to the scientist at the SCF. These specifications are defined by the Data Processing Focus Team. These specifications are implemented in the Data Production Software Delivery Package and support smooth integration of the data production software into the ECS production environment. | | EXT01.1<br>EXT02.1<br>EXT08.1 | | | | X<br>X<br>X |
| SCF-0080 | The ECS shall have the capability to provide an Interactive Session Dialog with the SCF. This dialog, to aid integration and test of the data production software into the ECS production environment, shall support, | IR-1: This requirement is supported as follows: IR-1 shall provide the | EXT01.1<br>EXT02.1<br>EXT08.1 | | | | X<br>X<br>X |

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| | at a minimum, general communications between the ECS and the SCF that include logins, mail messages, status reports, test coordination, test execution scripts, and solutions to minor problems. | capability for the SCF to access ECS remotely via a virtual terminal. | | | | | |
| SCF-0100 | The ECS shall have the capability to forward Test Products to the SCF. These products generated by the science software at the ECS will require the review of the scientist at the SCF who submitted the software. | IR-1: This requirement is supported as follows: IR-1 shall provide the capability of ECS to transfer files to the SCF via ftp. | EXT01.1<br>EXT02.1<br>EXT08.1 | | | | X<br>X<br>X |
| SCF-0110 | The ECS shall have the capability to receive Test Product Reviews from the SCF. These reviews shall include the comments and recommendations of the scientist at the SCF who has reviewed the Test Products. | IR-1: This requirement is supported as follows: IR-1 shall provide the capability for the SCF to transfer files to the AITTL CI via ftp. | EXT01.1<br>EXT02.1<br>EXT08.1 | | | | X<br>X<br>X |
| SCF-0120 | The ECS shall have the capability to receive Data Production Software Updates from the SCF. These Data Production Software Updates include modifications to any data production software already submitted to the ECS by the SCF. The Data Production Software Updates may include some or all the items required in the Data Production Software Delivery Package. | IR-1: This requirement is supported as follows: IR-1 shall provide the capability for the SCF to transfer files to the AITTL CI via ftp. | EXT01.1<br>EXT02.1<br>EXT08.1 | | | | X<br>X<br>X |
| SCF-0330 | The ECS shall have the capability to receive a Calibration Coefficient Update Package from the SCF. This package shall include a calibration coefficient file and other documentation needed to implement the updated coefficients. | IR-1: This requirement is supported as follows: IR-1 shall provide the capability for the SCF to transfer files to the AITTL CI via ftp. | EXT01.1<br>EXT02.1<br>EXT08.1 | | | | X<br>X<br>X |
| SDPS0010 | The SDPS shall provide CSMS with operational, and data processing, data quality status. | IR-1: IR-1 shall monitor the status of the Ingest and AI&T hardware. | FT01.1 | | | | X |
| SDPS0020 | The SDPS shall receive EOS science, and engineering data from the SDPF, and non-EOS ancillary data (as listed in Appendix C) from ADCs. | IR-1: Applies only to ingest and temporary storage for testing purposes only; data from | EXT03.1<br>EXT04.1 | | | | X<br>X |

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| | | NOAA will be via ftp of science and engineering data from SDPF, and ancillary data from ADCs (NOAA).<br><br>APPLIES ONLY TO GSFC DACC AND LaRC DAAC | | | | | |
| SDPS0080 | The SDPS shall archive, quality check all science data received from the EPDSs and ancillary data received from the ADCs. | IR-1: This requirement is supported as follows: IR-1 shall verify that data received from TRMM and NESDIS during interface testing was transmitted completely and without transmission errors. IR-1 does not archive this data. | EXT03.1<br><br>EXT04.1<br><br>EXT05.1<br><br>EXT05.9 | | | | X<br><br>X<br><br>X<br><br>X |
| SDPS0090 | The SDPS shall interface with the PIs and the other science users to support the development and testing of data product algorithms and QA of produced data products. | IR-1: Interface accomplished only through file transfer (e.g., FTP). Accepts QA data as part of its output. Interface clarification assumes e-mail provided by DAAC. | EXT01.1<br><br>EXT02.1<br><br>EXT08.1 | | | | X<br><br>X<br><br>X |
| SDPS0110 | The SDPS shall be responsible for coordination of the transfer of production and quick-look science and engineering data from SDPF. | IR-1: This requirement is supported as follows: IR-1 shall be responsible for coordination of the transfer of data from the SDPF for the purpose of testing the SDPF interface to the Ingest subsystem. | EXT03.2<br><br>EXT04.2 | | | | X<br><br>X |

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| SMC-2505 | The LSM shall update the system-wide inventory data base consisting of all hardware, system software, and scientific software contained within its element. | | Can't be verified in the test version (No SMC/LSM) | | | | |
| SMC-2510 | The SMC shall provide at a minimum system-wide configuration management for the operational hardware, scientific and system software, and the SMC toolkit contained within ECS. | CM for SS/W at sites, EDF CM for all IR-1 H/W and S/W Enhancements via Ops. | Can't be verified in the test version (No SMC/LSM) | | | | |
| SMC-2515 | The LSM shall provide configuration management for at least the operational hardware, system software, and scientific software within its element and for the migration of enhancements into the operational system. | IR-1: This requirement is supported as follows: IR-1 shall provide configuration management for the Science Software at the DAACs. IR-1 does not provide an LSM. | Can't be verified in the test version (No SMC/LSM) | | | | |
| SMC-3300 | The SMC shall monitor site and element hardware, and scientific and system software status to determine their operational states including, at a minimum:<br>a. On-line<br>b. Failed | IR-1: SNMP and COTS packages. To the extent of networks and host O/S. | Can't be verified in the test version (No SMC/LSM) | | | | |
| SMC-3305 | The LSM shall monitor its element's hardware, and scientific and system software status to determine their operational states including, at a minimum :<br>a. On-line<br>b. Failed | IR-1: This requirement is supported as follows: IR-1 shall monitor the operational status of DAAC hardware and software at the EDF. | FT01.1<br><br>FT02.2 | | | X<br><br>X | |
| SMC-3370 | For each performance parameter, the SMC shall have the capability of establishing multiple levels of thresholds to include, at a minimum:<br>a. On/off<br>b. Pass/fail<br>c. Various levels of degradation | | Can't be verified in the test version (No SMC/LSM) | | | | |
| SMC-3375 | For each limit checked parameter, the LSM (including those thresholds directed by the SMC) shall have the capability of evaluating multiple levels of thresholds including, at a minimum:<br>a. On/off | | Can't be verified in the test version (No SMC/LSM) | | | | |

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| | b. Pass/fail | | | | | | |
| SMC-3380 | The SMC shall evaluate overall system performance. | Ops. | Can't be verified in the test version (No SMC/LSM) | | | | |
| SMC-3390 | The SMC shall generate alert indicators of fault or degraded conditions. | | Can't be verified in the test version (No SMC/LSM) | | | | |
| SMC-3395 | The LSM shall generate, in response to each limit check threshold, alert indicators of fault or degraded conditions with the appropriate corrective actions. | | Can't be verified in the test version (No SMC/LSM) | | | | |
| SMC-3415 | The LSM shall perform short and long-term trend analysis of element performance, including, at a minimum:<br>a. Operational status<br>b. Performance of a particular resource<br>c. Maintenance activities (e.g., number of repairs per item) | IR-1: This requirement is supported as follows: IR-1 shall monitor the operational status of DAAC hardware and software at the EDF and will provide performance monitoring and Office Automation tools at the local sites. IR-1 does not provide an LSM. | Can't be verified in the test version (No SMC/LSM) | | | | |
| SMC-4305 | The LSM shall maintain fault management policies and procedures for its element. | IR-1: This requirement is supported as follows: IR-1 shall support the M&O staff in the maintenance of fault management policies and procedures with Office Automation tools at the local sites. | Can't be verified in the test version (No SMC/LSM) | | | | |
| SMC-4310 | The SMC shall perform fault analysis including, at a minimum:<br>a. Isolation<br>b. Location | IR-1: to extent SMC-3300 is performed.<br>To the extent of | Can't be verified in the test version (No | | | | |

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| | c. Identification<br>d. Characterization | networks and host O/S. | SMC/LSM) | | | | |
| SMC-4311 | he SMC shall have the capability to perform fault analysis to the level of, at a minimum:<br>a. Subsystem<br>b. Equipment | IR-1: to extent SMC-3300 is performed. To the extent of networks and host O/S. | Can't be verified in the test version (No SMC/LSM) | | | | |
| SMC-4315 | The LSM shall, at a minimum, isolate, locate, and identify faults, identify subsystem, equipment, and software faults, and identify the nature of the faults within its element. | | Can't be verified in the test version (No SMC/LSM) | | | | |
| SMC-4320 | SMC shall support fault diagnosis testing to include, at a minimum: b. Resource-to-resource connectivity testing | IR-1: to extent SMC-3300 is performed. To the extent of networks and host O/S. | Can't be verified in the test version (No SMC/LSM) | | | | |
| SMC-4325 | The LSM shall request fault diagnosis testing be performed, including, at a minimum:<br>b. Resource-to-resource connectivity testing within its element | IR-1: b to extent of SMC-3305 | Can't be verified in the test version (No SMC/LSM) | | | | |
| SMC-5320 | The SMC shall establish, maintain, and authenticate access privileges for ECS scientific users. | | Can't be verified in the test version (No SMC/LSM) | | | | |
| SMC-5325 | The LSM shall promulgate, maintain, authenticate, and monitor user and device accesses and privileges. | | Can't be verified in the test version (No SMC/LSM) | | | | |
| SMC-5330 | The SMC shall provide support, manage, maintain, and request security testing that includes, at a minimum, password checking. | | Can't be verified in the test version (No SMC/LSM) | | | | |
| SMC-5335 | The LSM shall perform security testing that includes, at a minimum, password auditing and element internal access/privileges checking. | | Can't be verified in the test version (No SMC/LSM) | | | | |
| SMC-5365 | The LSM shall generate recovery actions in response to the detection of compromises. | | Can't be verified in the test version (No SMC/LSM) | | | | |
| SMC-8840 | The SMC shall have the capability to | At EDF. | Can't be | | | | |

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| | generate detailed and summary reports indicating the performance of ground resources, including, at a minimum:<br>c. Resource utilization | | verified in the test version (No SMC/LSM) | | | | |
| SMC-8880 | The SMC shall have the capability to generate detailed and summary security compromise reports indicating security compromises of ground resources and facilities, including, at a minimum:<br>a. Security compromise type and description<br>b. Time of occurrence | | Can't be verified in the test version (No SMC/LSM) | | | | |
| TRMM1010 | The ECS LaRC DAAC shall ingest CERES data from SDPF. | | EXT04.2 | | | | X |
| TRMM1020 | The SDPF to the ECS LaRC DAAC data stream shall include Level 0 and quick-look data sets. | | EXT04.2 | | | | X |
| TRMM1030 | The SDPF Level 0 and quick-look data sets for CERES shall contain quality and accounting information. | | EXT04.2 | | | | X |
| TRMM1060 | The ECS LaRC DAAC shall, after notification by SDPF, retrieve CERES Level 0 production by an agreed-upon file transfer protocol. | IR-1: For IR-1, this applies to ingest and temporary storage of data from the SDPF for testing purposes only. | EXT04.2 | | | | X |
| TRMM1080 | The ECS LaRC DAAC shall acknowledge successful receipt of a CERES data set from the SDPF. | | EXT04.2 | | | | X |
| TRMM1200 | The ECS LaRC DAAC shall ingest predicted orbit data from the SDPF. | IR-1: This requirement is supported as follows: IR-1 shall have the capability at the LaRC DAAC, to receive data from the SDPF for the purpose of testing the ingest interface between IR-1 and the SDPF. | EXT04.2 | | | | X |
| TRMM1210 | The ECS LaRC DAAC shall ingest definitive orbit data from the SDPF. | IR-1: This requirement is supported as follows: IR-1 shall have the capability at the LaRC DAAC , to receive data | EXT04.2 | | | | X |

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| | | from the SDPF for the purpose of testing the ingest interface between IR-1 and the SDPF. | | | | | |
| TRMM1230 | The CERES instrument team and science team shall define the ancillary, correlative, and flight dynamics data and algorithms needed for their processing. | IR-1: External requirement: Information only. No action is required by ECS. | Where (what document) is this defined? | X | | | |
| TRMM1240 | The CERES instrument team and science team shall provide the quick-look data processing algorithms and quick-look operations concept needed for CERES. | IR-1: External requirement: Information only. No action is required by ECS. | Where (what document) is this defined? | X | | | |
| TRMM1280 | ECS shall be able to accept CERES simulated data from SDPF. | IR-1: This requirement is supported as follows: IR-1 shall have the capability to receive CERES simulated data from the SDPF for the purpose of testing the ingest interface between IR-1 and the SDPF. | EXT04.2 | | | | X |
| TRMM1290 | The interfaces between TRMM and ECS shall make appropriate use of standards for data structures and data transport as defined for use within the publications of CCSDS and ISO/OSI, and shall use commercial off-the-shelf (COTS) hardware and software products as appropriate. | | Not testable | | | | |
| TRMM2010 | The ECS MSFC DAAC shall ingest LIS data from SDPF. | IR-1: IR-1 shall have the capability at the GSFC DAAC, to receive LIS data from the SDPF for the purpose of testing the ingest interface between IR-1 and the SDPF. | EXT03.2 | | | | X |
| TRMM2020 | The SDPF to the ECS MSFC DAAC data stream shall include Level 0 and quick-look data sets. | IR-1: External requirement: Information only. No action is required by ECS. | EXT03.2 | | | | X |

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| TRMM2030 | The SDPF Level 0 and quick-look data sets for LIS shall contain quality and accounting information. | External requirement: Information only. No action is required by ECS. | EXT03.2 | | | | X |
| TRMM2190 | The ECS MSFC DAAC shall ingest predicted orbit data from the SDPF. | IR-1: IR-1 shall have the capability at the GSFC DAAC, to receive data from the SDPF for the purpose of testing the ingest interface between IR-1 and the SDPF. | EXT03.2 | | | | X |
| TRMM2200 | ECS MSFC DAAC shall ingest definitive orbit data from the SDPF. | IR-1: IR-1 shall have the capability at the GSFC DAAC, to receive data from the SDPF for the purpose of testing the ingest interface between IR-1 and the SDPF. | EXT03.2 | | | | X |
| TRMM2220 | The LIS science team and instrument team shall define the ancillary, correlative, and flight dynamics data and algorithms needed for their processing. | IR-1: External requirement: Information only. No action is required by ECS. | Where (what document) is this defined? | X | | | |
| TRMM2230 | The LIS instrument team and science team shall provide the quick-look data processing algorithms and quick-look operations concept needed for LIS. | IR-1: External requirement: Information only. No action is required by ECS. | Where (what document) is this defined? | X | | | |
| TRMM2270 | ECS shall be able to accept LIS simulated data from SDPF. | IR-1: This requirement is supported as follows: IR-1 shall have the capability to receive LIS simulated data from the SDPF for the purpose of testing the ingest interface between IR-1 and the SDPF. | EXT03.2 | | | | X |
| TRMM2280 | The interfaces between TRMM and ECS shall make appropriate use of standards for data structures and data transport as defined for use within the publications of CCSDS | | Not testable | | | | |

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| | and ISO/OSI, and shall use COTS hardware and software products as appropriate. | | | | | | |
| TRMM3010 | The ECS MSFC DAAC shall ingest Level 1A data for PR and TMI from TSDIS. | IR-1: This requirement is supported as follows: IR-1 shall have the capability at the GSFC DAAC, to receive Level 1A data for PR and TMI from TSDIS, for the purpose of testing the ingest interface between IR-1 and TSDIS. | EXT05.9 | | | | X |
| TRMM3020 | The ECS MSFC DAAC shall ingest TRMM standard products (Level 1B-3B) for PR, and TMI from TSDIS. | IR-1: This requirement is supported as follows: IR-1 shall have the capability at the GSFC DAAC, to receive standard products for PR and TMI from TSDIS, for the purpose of testing the ingest interface between IR-1 and TSDIS. | EXT05.9 | | | | X |
| TRMM3030 | The ECS MSFC DAAC shall ingest TRMM browse products for PR and TMI from TSDIS. | IR-1: This requirement is supported as follows: IR-1 shall have the capability at the GSFC DAAC, to receive browse products for PR and TMI from TSDIS, for the purpose of testing the ingest interface between IR-1 and TSDIS. | EXT05.11 | | | | X |
| TRMM3040 | The ECS MSFC DAAC shall ingest algorithms and documentation for PR and TMI from TSDIS. | IR-1: This requirement is supported as follows: IR-1 shall have the capability | EXT05.12 | | | | X |

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| | | at the GSFC DAAC, to receive algorithms and documentation for PR and TMI from TSDIS, for the purpose of testing the ingest interface between IR-1 and TSDIS. | | | | | |
| TRMM3050 | The ECS MSFC DAAC shall ingest TRMM Ground Validation (GV) data products and associated metadata from TSDIS. | IR-1: This requirement is supported as follows: IR-1 shall have the capability at the GSFC DAAC, to receive Ground Validation Data from TSDIS, for the purpose of testing the ingest interface between IR-1 and TSDIS. | EXT05.9 | | | | X |
| TRMM3120 | Communications between TSDIS and the ECS MSFC DAAC to transport the PR, TMI, and GV Level 1A data, Level 1B-3B standard products, metadata, SSM/I ancillary data, algorithms, and documentation shall be provided by ESDIS. | | EXT05.9 | | | | X |
| TRMM3140 | The interfaces between TRMM and ECS shall make appropriate use of standards for data structures and data transport as defined for use within the publications of CCSDS and ISO/OSI, and shall use COTS hardware and software products as appropriate. | | Not testable | | | | |
| TRMM4010 | The ECS GSFC DAAC shall ingest Level 1A data for VIRS from TSDIS. | IR-1: This requirement is supported as follows: IR-1 shall have the capability at the GSFC DAAC, to receive Level 1A data from VIRS from TSDIS for the purpose of testing the ingest interface between IR-1 and TSDIS. | EXT05.1 | | | | X |
| TRMM4020 | The ECS GSFC DAAC shall ingest TRMM | IR-1: This | EXT05.1 | | | | X |

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| **Paragraph ID** | **Requirement Text** | **Clarification** | **Test Case ID** | **Test Method** | | | |
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| | standard products Level 1B-3B for VIRS from TSDIS. | requirement is supported as follows: IR-1 shall have the capability at the GSFC DAAC, to receive Level 1B-3B data from VIRS from TSDIS for the purpose of testing the ingest interface between IR-1 and TSDIS. | | | | | |
| TRMM4030 | The ECS GSFC DAAC shall ingest TRMM browse products for VIRS from TSDIS. | IR-1: This requirement is supported as follows: IR-1 shall have the capability at the GSFC DAAC, to receive TRMM browse products for VIRS from TSDIS for the purpose of testing the ingest interface between IR-1 and TSDIS. | EXT05.1 | | | | X |
| TRMM4040 | The ECS GSFC DAAC shall ingest from TSDIS algorithms and documentation for VIRS. | IR-1: This requirement is supported as follows; IR-1 shall have the capability at the GSFC DAAC, to receive algorithms and documentation for VIRS from TSDIS for the purpose of testing the ingest interface between IR-1 and TSDIS. | EXT05.1 | | | | X |
| TRMM4110 | Communications between TSDIS and the ECS GSFC DAAC to transport the VIRS Level 1A data, Level 1B-3B standard products, metadata, AVHRR, GPI, GPCP, and NMC ancillary data, and algorithms and documentation shall be provided by ESDIS. | | EXT05.1 | | | | X |
| TRMM4120 | TSDIS and ECS shall each provide an | | EXT05.1 | | | | X |

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| | interface to the GSFC local area network. | | | | | | |
| TRMM4140 | The interfaces between TRMM and ECS shall make appropriate use of standards for data structures and data transport as defined for use within the publications of CCSDS and ISO/OSI, and shall use COTS hardware and software products as appropriate. | | Not testable | | | | |
| TRMM5010 | ECS shall ingest TRMM metadata, and browse from TSDIS along with the TRMM standard products in the ECS format. | IR-1: This requirement is supported as follows: IR-1 shall have the capability to receive TRMM metadata and browse data from TSDIS, in ECS format, along with the TRMM standard products for the purpose of testing the ingest interface between IR-1 and TSDIS. | EXT05.1<br>EXT05.2<br>EXT05.3<br>EXT05.9<br>EXT05.10 | | | | X<br>X<br>X<br>X<br>X<br>X |
| TRMM5030 | ECS shall have the capability to ingest directory and guide information from TSDIS. | IR-1: This requirement is supported as follows: IR-1 shall have the capability to receive directory and guide information from TSDIS for the purpose of testing the ingest interface between IR-1 and TSDIS. | EXT05.5 | | | | X<br>X |

# Appendix B: LIST OF ACRONYMS

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|---|---|
| ASTER | Advanced Spaceborne Thermal Emission and Reflection Radiometer |
| CCL | Closed Conference Link |
| CERES | Clouds and Earth's Radiant Energy System |
| COTS | Commercial Off-The-Shelf |
| DAA | Data Availability Acknowledgment |
| DAAC | Distributed Active Archive Center |
| DAN | Data Availability Notice |
| DESIM | DDF Simulator |
| DDF | Data Distribution Facility |
| DDA | Data Delivery Acknowledgment |
| DDN | Data Delivery Notice |
| DRA | Data Retrieval Acknowledgment |
| EBnet | EOSDIS Backbone Network |
| ECS | EOS Core System |
| EDC | EROS Data Center |
| EDF | ECS Development Facility |
| EDU | EDOS Data Unit |
| EGS | EOS Ground System |
| EOS | Earth Observing System |
| EOSDIS | Earth Observing System Data Information System |
| EROS | Earth Resources Observation System |
| FDF | Flight Dynamics Facility |
| FOV | Field of View |
| ftp | file transfer protocol |
| GSFC | Goddard Space Flight Center |
| GUI | Graphic User Interface |
| GV | Ground Validation |
| ICD | Interface Control Document |
| IMS | Information Management System |

| | |
|---|---|
| IP | Internet Protocol |
| IR-1 | Interim Release 1 |
| I&T | Integration and Test |
| kftp | kerberos file transfer protocol |
| LaRC | Langley Research Center |
| LIS | Lightning Imaging Sensor |
| MSFC | Marshall Space Flight Center |
| M&O | Maintenance and Operations |
| NASA | National Aeronautic and Space Administration |
| NSI | NASA Science Internet |
| PGS | Product Generation Services |
| PR | Precipitation Radar (TRMM) |
| SCF | Science Computing Facility |
| SDP | Science Data Processing |
| SDPF | Sensor Data Processing Facility |
| SMC | System Monitoring and Coordination Center |
| SMO | Systems Management Office |
| **TBD** | To Be Determined |
| TC | Test Conductor |
| TGS | TRMM Ground System |
| TMI | TRMM Microwave Imager |
| TRMM | Tropical Rainfall Measuring Mission |
| TRR | Test Readiness Review |
| TSDIS | TRMM Science Data and Information System |
| VIRS | Visible Infrared Scanner |
| V0 | Version 0 |
| WWW | World Wide Web |